A Comparison of the Natural Resource Management Regimes of Tasmania and Taiwan

by

Henry Cheng-li Chen

B Sc, Chinese Culture University, Taipei, M Env St, University of Tasmania

Submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy (Environmental Studies)

Centre for Environmental Studies

School of Geography and Environmental Studies

University of Tasmania

Hobart, Australia

February, 2000

DECLARATION

Accept where duly acknowledged, this thesis contains no material which has been accepted for the award of any degree or diploma in any tertiary institution and, to the best of the candidate's knowledge and belief, contains no material previously published or written by another person, expect when due reference in made.

Signed .....

AUTHORITY OF ACCESS

This thesis may be made available for loan and limited copying in accordance with the *Copyright Act 1968*.

Signed 12/11/01

ABSTRACT

This thesis examines and compares two natural resource management regimes, those of the Australian State of Tasmania and the sovereign state of Taiwan, with a focus upon their respective terrestrial natural reserve systems. Recommendations for future improvements are made for both islands.

Taiwan is an island about half the size of Tasmania, yet the former has a population more than 48 times greater than the latter. The two island ecosystems are similar in some respects, but the contrasts are more marked than the similarities. It would be beneficial for both islands to share their experiences of natural resource management. This study undertakes such a comparison with a view to facilitating exchange of knowledge in the field of environmental management.

Despite its dramatically smaller population, Tasmania's terrestrial natural resource management is more highly developed than Taiwan's in some respects. For example, the New Public Management (NPM) model has been employed as a framework for regime reform in Tasmania, but not in Taiwan. There is,

nevertheless, room for improvement in planning and practice on both islands. The Tasmanian government structure provides a more integrated approach to natural resource management, especially with regard to its nature reserve system, and Taiwan could learn from this in planning for the future. The successful Landcare movement and accumulated treaty-derived conservation experience, in, for example, World Heritage Area and Ramsar site management, are appropriate for adaptation in Taiwan to foster community involvement and prepare itself for the transition to involvement in international affairs. On the other hand, the integrated environmental education coordination across governmental agencies in Taiwan, although not yet implemented, could be considered as a future approach in Tasmania.

ACRONYMS

AAEE	Australian Association for Environmental Education
ACF	Australia Conservation Foundation
AEC	Australian Education Council
ANM	Australia Newsprint Mills
CDC	Curriculum Development Centre (Australia)
CITES	Convention on International Trade in Endangered Species
COA	Council of Agriculture (Taiwan)
CP	Community Partnership section (Tasmania)
CPA	Construction and Planning Administration (Taiwan)
CVFS	Community, Visitor and Field Services branch (Tasmania)
DELM	Department of Environment and Land Management (Tasmania)
DLPW	Department of Lands, Parks and Wildlife (Tasmania)
DNPWS	Department of National Parks and Wildlife Service (Tasmania)
DPIF	Department of Primary Industry and Fisheries (Tasmania)
DPIWE	Department of Primary Industries, Water and Environment (Tasmania)
DPWH	Department of Parks, Wildlife and Heritage (Tasmania)
EPA	Environmental Protection Administration (Taiwan)

FT	Forestry Tasmania
HEC	Hydro-electric Corporation (Tasmania)
KMT	Kuo Min Tang (Nationalist Party, Taiwan)
LEAP	Landcare and Environmental Action Program (Australia)
MAR	minimum areas required
MOE	Ministry of Education (Taiwan)
MVP	minimum viable populations
NCSA	National Conservation Strategy for Australia
NFF	National Farmers' Federation (Australia)
NGOs	Non Government Organisations
NLP	National Landcare Program (Australia)
NPM	New Public Management
NPWS	National Parks and Wildlife Service (Tasmania)
NSCP	National Soil Conservation Program (Australia)
NSESD	National Strategy for Ecologically Sustainable Development (Australia)
RMPS	Resource Management and Planning System
SCAC	Soil Conservation Advisory Committee (Australia)
SCS	Soil Conservation Strategy (Australia)

SDAC	Sustainable Development Advisory Council (Tasmania)
SPP Act	State Policies and Projects Act (Tasmania)
Tas	Tasmania
TW	Taiwan
UN	United Nations
UNEP	United Nations Environmental Program
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNSO	United Nations Statistics Office
WBSC	Wild Bird Society, Republic of China (Taiwan)
WHA	World Heritage Area
WRB	Water Resources Bureau (Taiwan)
YMSNP	Yang Ming Shan National Park (Taiwan)

TABLE OF CONTENTS

TABLE OF FIGURES

ACKNOWLEDGMENTS

Thank heaven and earth, there are so much and many to acknowledge.

First, I would like to thank my supervisors Dr. Peter Hay and Professor Jamie Kirkpatrick, for their ongoing inspiration and tuition during the preparation of this thesis, especially through my very difficult time of changing research topics after spending one and half years of candidature.

Special thanks go to examiners and Dr. Marcus Howard. Without them, the revision would not have been as successful and practical.

Much appreciation is felt for Dr. Achoy Yong and Mrs. Georgina Beekmeijer, who have provided warmth and assistance during my studying in Australia, especially for their proofreading of my thesis.

Thanks also to the staff and students of the Centre for Environmental Studies who have provided an atmosphere of friendship and inquiry.

Last but not least, my deepest thanks to my parents, Mr. Yen-shu Chen and Mrs. Hsiu-chin Chen-Li, and my wife, Betty Ju Fang Hsiao, for their endless love, support and encouragement.

Chapter 1

INTRODUCTION

The resolution of environmental problems caused by human interaction with the environment requires careful environmental management, and any given jurisdiction can benefit from comparison with environmental management regimes in place elsewhere. Taiwan is an island about half the size of Tasmania yet has more than 48 times the population. The islands' ecosystems are similar in some respects, but the contrasts between them are far more pronounced. This is the first study involving a comparison of natural resource management between Tasmania and Taiwan.

1.1 Origin of the research

After living and studying in Tasmania for several years, and noticing the different management systems and the different environmental issues pertaining

in Tasmania and my home island, Taiwan, the question persistently recurred: could one learn from the other to improve their environmental practice? The process of finding the answer has proven more difficult than expected. It is a complex assignment, as environmental issues interrelate with politics, economics and personal values. For the purpose of making the project manageable, the research area was narrowed down. Being a Park ranger by background, the author has chosen to focus on natural resource management, particularly within National Parks and other nature reserve systems.

1.2 Research objectives

This study examines the governmental agencies of Taiwan and Tasmania charged with natural resource management, with a focus on terrestrial natural reserve systems. The three objectives are listed below.

1. To compare structure and function between governmental agencies concerned with terrestrial natural resource management in Tasmania and Taiwan.

2. To identify some problems of terrestrial natural resource management and suggest appropriate resolutions for both Tasmania and Taiwan.

3. To recommend adjustments to terrestrial natural resource management practices for both Taiwan and Tasmania in the light of nature reserve planning theory and the framework of the New Public Management, via recourse to a manager opinion survey conducted upon both islands.

An hypothesis related to the objectives addressed in this study is that reform in structure and process within the New Public Management (NPM) model provides a framework for developing an approach suitable to terrestrial natural resource management, particularly for National Parks and reserves, in Taiwan and Tasmania.

1.3 Methodology

Three methods were employed to conduct this study, as listed below.

1.3.1 Literature review: the collection and analysis of related documents

Academic writings, theses, governmental publications and related materials from both islands, some of which are written in Chinese, were used.

1.3.2 Critical comparison: review of structures and environmental practices

The differences between governmental levels, responsibilities, and practices in the two islands are critically compared. This involves reviewing past and present structures and also considering trends into the future. Throughout the research period, both islands experienced structural change. The trend of government structural modification is documented. From the similarities and contrasts in different natural resource management regimes, practical recommendations can be made to improve future management.

1.3.3 Qualitative survey: interviews of management personnel from different agencies

Key player interviews were conducted with selected personnel from both islands in order to secure the firsthand insight into natural resource management needed to provide practical recommendations for improvement. A face to face interview

technique was employed with open-ended questions sent to participants before interviews. As English is not the first language for the author, and for the accuracy of the interview record, all interviews were conducted by tape recording, with interviewees' consent.

1.4 Limitations of the study

There were several constraints to the study.

1.4.1 A new study

Although there are similar studies of natural resource management, their research scope and focus varies. Only Western countries have been used as comparative case studies for Australia, whilst Taiwan tends to take Japan and the United States of America as nature resource management models to follow (Ackerman, 1953; Huang, 1985; Zhang, 1988). There is, too, almost no relevant English-language material available for Taiwan; literature is thus limited and difficult to obtain. This is the first comparative study of nature resource management between two islands of similar size, but with many other natural and cultural contrasts.

1.4.2 An interdisciplinary study

Natural resource management is interrelated with the ecological, environmental planning, political, legal and regulative, and economic factors that draw connections across the natural and social sciences. Though it is impossible to cover all aspects in detail, it is still necessary to ensure that all important issues are addressed.

1.4.3 Survey restriction

It would have been beneficial to survey as many personnel as possible to create a more complete picture, however, such a large-scale undertaking was impracticable. Accordingly, available and representative personnel were selected for this study.

1.4.4 Time and finance constraints

During the research period, both islands underwent considerable change to their respective machinery of government. These changes will influence natural resource management greatly, and they were still not finalised at the time of completion of this thesis. There is also a need for further study in other sectors of environmental management in order to test these conclusions beyond their application to nature reserve systems. Due to research funding restrictions, only a small amount of time was spent in Taiwan collecting information and conducting interviews.

1.5 Thesis outline

The next chapter describes the geography, population and nature reserves in Tasmania and Taiwan. Chapter three will discuss the framework of organisational reform. A discussion of management theory, and of New Public Management in particular, is presented. Political backgrounds on both islands are discussed in chapter four. Chapter five examines the administrative structure of natural resource management, at different levels, both in Taiwan and Tasmania. This is followed in chapter six by a review of environmental problems and

management practices on both islands. Chapter seven looks into theory and development of the respective nature reserve systems, and provides guidelines and critiques for planning and improving management. The survey of managers is presented and discussed in chapter eight. The final chapter sums up findings from previous chapters and provides recommendations for both Tasmania and Taiwan to improve their natural resource management.

Chapter 2

GEOGRAPHY, POPULATION AND NATURE RESERVES IN TASMANIA AND TAIWAN

This chapter reports and compares statistics for the two islands. The following table provides a synopsis of the differences and more description follows.

Table 1. Statistics for Tasmania and Taiwan

Island / Item	**Tasmania**	**Taiwan**
Population (n)	475000	23000000
Density (n/ km^2)	7	639
Land area (km^2)	68000	36000
Length (km)	296	394
Width (km)	315	144
Native species number (biodiversity indicator)		
Mammal (n)	86	60
Bird (n)	331	450
Reptiles (n)	27	94
Amphibian (n)	11	30
Insect (n)	7641	15000
Climate type		
Weather zone	**temperate maritime**	**subtropical/tropical maritime**
Reserve number		
Ramsar site (n)	10	0
National Parks (n)	18	6
W H A (n)	2	0

Figure 1. Geographical location of Tasmania and Taiwan (Heinemann, 1995: 58)

2.1 Geography and physiography of Tsmania

The main island of Tasmania is located in the Southern Ocean, lying south and about 240 kilometres off the south-east coast of mainland Australia, from which it is separated by Bass Strait; and to the west of New Zealand, from which it is separated by the Tasman Sea (see Figure 1). The land area is about 68000 square kilometres (including offshore islands). The length of the main island is 296 kilometres from north to south and 315 kilometres from east to west at its widest point (Commonwealth Government, 1999: 24, 36).

Tasmania is in the temperate zone and practically the whole island is well watered with no marked seasonal concentration in the drier east and a winter maximum in the wetter west. Eight mountains exceed 1500 metres, 28 are above 1220 metres and a substantial part of the island is above 900 metres (see Figure 2). The tallest peak is Mount Ossa at 1617 metres (Commonwealth Government, 1999: 36).

Tasmania has, for the most part, a temperate maritime climate (Commonwealth Government, 1999: 36), and supports a wide variety of flora and fauna. Being isolated from the Australian mainland it has supported Australian biodiversity by providing a refuge for species that have died out on the mainland, and it has been

protected from many of the introduced species that have adversely affected the flora and fauna of mainland Australia. There are 86 species of mammals, 331 species of birds, 27 species of reptiles, 11 amphibian species, nearly 700 species of freshwater and sea fish, and 7641 named insect species known to exist in Tasmania (Commonwealth Government, 1999: 18-19).

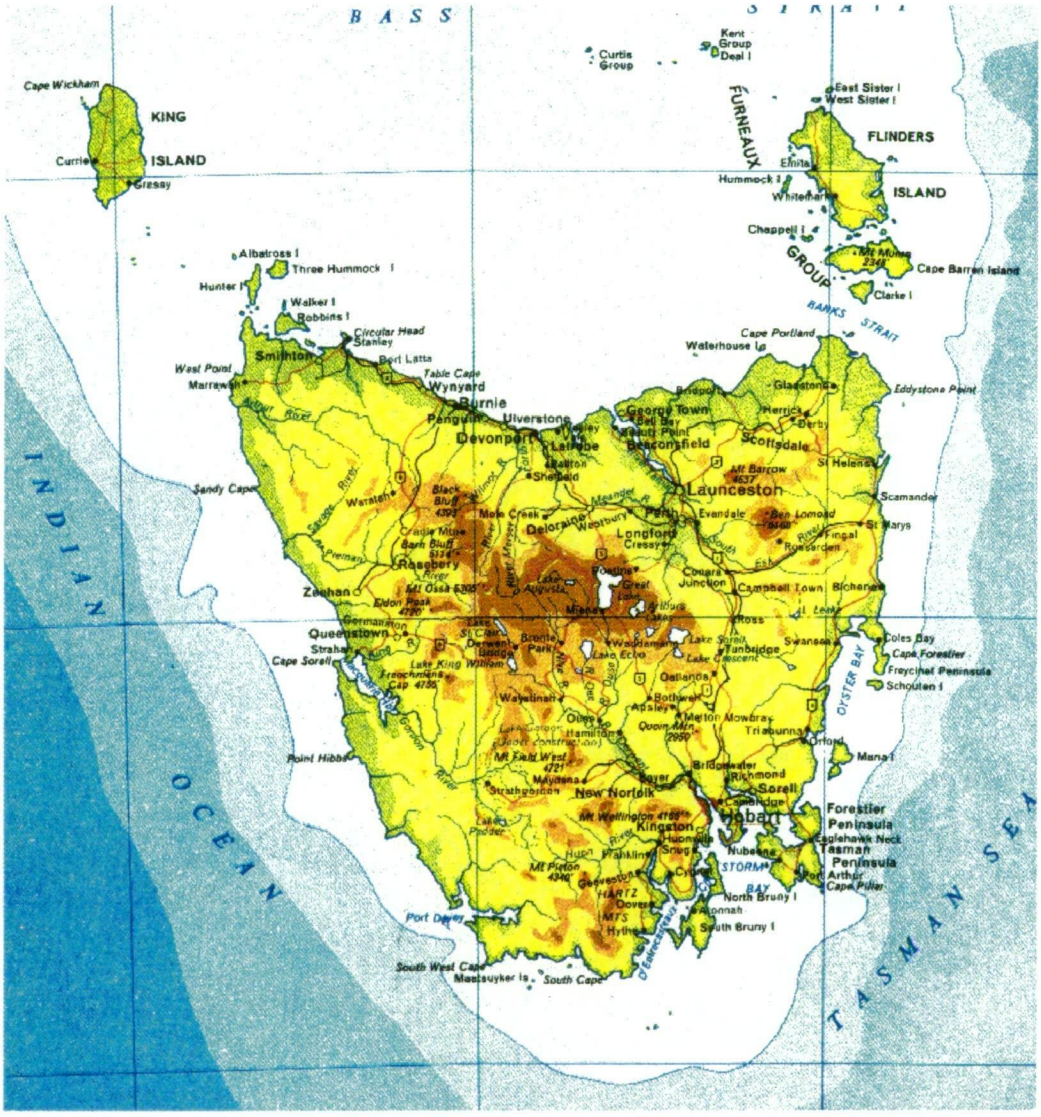


Figure 2. Tasmania (http://www.goodpractice.tased.edu.au/tasmania.htm)

2.2 Geography and physiography of Taiwan

The main island of Taiwan is located in the western Pacific Ocean between Japan and the Philippines, and about 200 kilometres off the eastern coast of mainland China, from which it is separated by the Taiwan Strait (see Figure 1). The land area is about 36000 square kilometres, with a length of 394 kilometres from north to south, and 144 kilometres from east to west at its widest point (Government Information Office, 1997: 6). Forested mountains dominate Taiwan. Almost three fourths of the country is sloping land (land over 10 metres elevation and over 5 percent slope), and nearly half of the total area of the main island is above 1000 metres. Almost all flat land, and an increasing amount of sloping land, is intensively cultivated. The majority of cultivated land is below 500 metres on the western plain of the island, while the mountains, which are sparsely inhabited by humans, are the main habitat of the majority of Taiwan's wildlife(http://www.coa.gov.tw/external/preserve/preserve/english/nat_env/natural_env.htm).

Taiwan's most prominent physiographical feature is its 270 kilometre central mountain range, which boasts more than 200 peaks towering over 3000 metres above sea level. At 3952 metres, the summit of Mount Jade is the highest point on the island (see Figure 3).

Foothills lead from the central range to tablelands and coastal plains in the west and south. The eastern shore is relatively steep, and the northern tip of the island is dominated by volcanic mountains of over 1000 metres in elevation (Government Information Office, 1997: 6).

Because Taiwan lies across the Tropic of Cancer, the climate is subtropical in the north and tropical in the south at sea level. Due to Taiwan's comparatively large altitude range, plant and animal life is diverse, with tropical, subtropical and temperate ecosystems (Government Information Office, 1997: 7).

Taiwan's location between two major climatic zones and its diverse topography have endowed the area with a broad variety of flora and fauna. Some 60 species of mammals, around 450 species of birds (40 percent of which are resident), 94 species of reptiles, 30 amphibian species, nearly 130 species of freshwater fish, and 15000 named insect species (including 400 butterfly species) are known to exist in Taiwan (Government Information Office, 1997: 93).

Figure 3. Taiwan (http://www.lib.utexas.edu/Libs/PCL/Map_collection/middle_east_and_asia/Taiwan.GIF)

2.3 Comparison of physiography of Tasmania and Taiwan

From north to south Taiwan is about 1.33 longer than Tasmania - not a great difference. However, the widest extent from east to west in Taiwan is only fourteen per cent of Tasmania's, and this makes the land area of Taiwan about 53 percent of that of Tasmania.

Regarding population density, the number of people in Taiwan has reached more than 23 million, which is about 639 persons per square kilometre. Tasmania has an estimated 475000 people, making about seven persons per square kilometre (Commonwealth Government, 1999: 88). The population density in Taiwan is thus more than 91 times greater than in Tasmania. Based on this fact, we can expect far more pressure for land development in Taiwan than in Tasmania. This vast difference must be taken into account when comparatively assessing natural resource management in the two islands.

2.4 The terrestrial nature reserve system in Tasmania

Tasmania has 61 percent of its land area under public ownership, and this is managed by a number of agencies, most notably Forestry Tasmania (FT), the Department of Primary Industries, Water and Environment (DPIWE), and the Hydro-electric Corporation (HEC). The Tasmanian Parks and Wildlife Service Division within the DPIWE manages National Parks, reserves and World Heritage Areas, and is responsible for about 30 percent of the land area of Tasmania (DPIWE, 2000: 4). Conservation in areas not reserved, especially on private lands, has been addressed through several initiatives. Programs such as Landcare and Land for Wildlife, along with the *Threatened Species Protection Act 1995* (Tas.), are recent mechanisms for off-reserve conservation. Though based upon the principles of cooperative arrangements with stakeholders and owners, there is also a capacity under the latter Act to enforce the protection of threatened species in certain situations (Commonwealth Government, 1999: 24).

2.4.1 National Parks in Tasmania

The *Tasmanian National Parks and Wildlife Act 1970* (Tas.) makes provision for the establishment and management of National Parks and other reserves and the

conservation of flora and fauna. These provisions included the development of land for conservation of flora and fauna, providing education facilities, and enforcing regulations under the Act. There are 18 National Parks in Tasmania with 15 on mainland Tasmania and three on offshore islands (see Figure 4). Declarations of National Parks were made as early as 1916, with the latest in 1999, and their areas range from 608298 hectares to 1345 hectares (Commonwealth Government, 1999: 24-25).

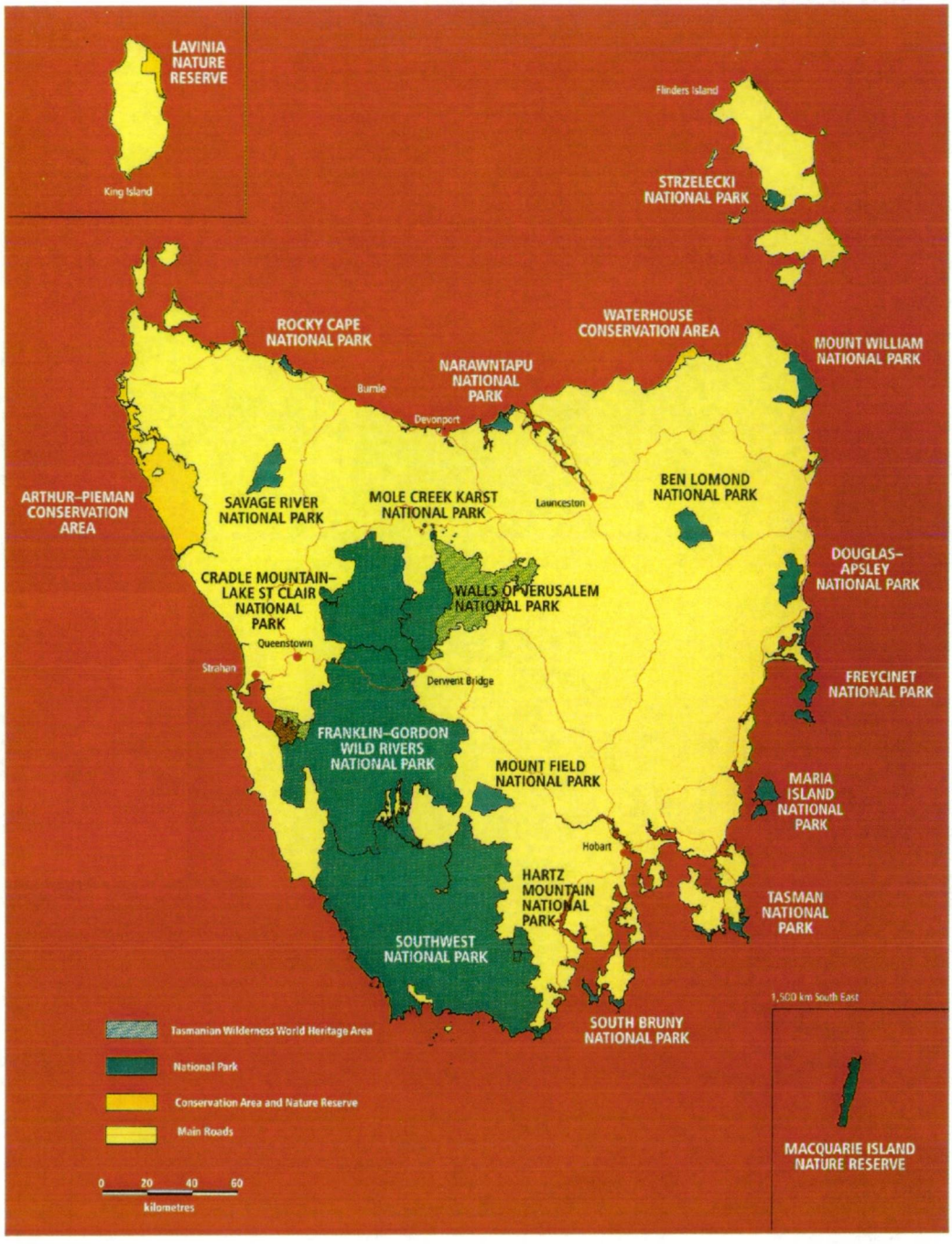


Figure 4. National Parks in Tasmania (DPIWE, 2000: 3)

2.4.2 Tasmanian Wilderness World Heritage Area

A number of reserves are included in Tasmania's two World Heritage Areas (WHA), the Tasmanian Wilderness WHA and Macquarie Island WHA (DPIWE, 2000: 4). In 1982, the three large western wilderness National Parks (the Cradle Mountain-Lake St Clair, Southwest, and Franklin-Gordon Wild Rivers National Parks) were inscribed on the World Heritage List by the World Heritage Committee of UNESCO. A further listing in 1989 enlarged the original area by approximately 600000 hectares. The Tasmanian Wilderness World Heritage Area now comprises 1.37 million hectares, or about 33 percent of all public land. It includes areas of very tall eucalypt forest, extensive cave systems, a core breeding area for the endangered Orange-bellied Parrot and ice age Aboriginal cave-art sites (Commonwealth Government, 1999: 26).

2.4.3 Other reserves in Tasmania

There are 55 Nature Reserves, 51 State Reserves and 4 Marine Reserves in Tasmania (DPIWE, 2000: 4). Nature Reserves and Marine Reserves are dedicated to nature conservation. State Reserves are managed for the same goals as National Parks. For example, Mountain Wellington Park is a State Reserve

that is managed for nature conservation but it is not managed by the Parks and Wildlife Service. In addition, the Forest Reserve System is managed for nature conservation and its regulations are as strong as National Parks. These areas can assist the survival of wildlife by providing for the conservation of habitats that can be utilised for breeding, feeding, or during migration.

Some reserves have been proclaimed for the protection of historic and Aboriginal values. In 1996, some of these areas were handed back to the Aboriginal community (Commonwealth Government, 1999: 24-25).

2.5 The terrestrial nature reserve system in Taiwan

In Taiwan, nearly ten percent of the land has been set aside in nature reserves, including National Parks. This land is managed by a number of agencies, including the Taiwan Forestry Bureau, the 'special municipalities', city or county governments, and the Construction Department for National Parks (Government Information Office, 1997: 92).

2.5.1 National Parks in Taiwan

The *National Parks Law 1976* (TW.) made provision for the establishment and management of National Parks. There are six National Parks in Taiwan, with five on mainland Taiwan and one on offshore Kimmen Isle (see Figure 5). Declarations of National Parks were first made in 1984, with the latest in 1995, and their areas range from 105490 hectares to 3780 hectares.

Figure 5. National Parks in Taiwan (http://2000.taroko.gov.tw/)

2.5.2 Other reserves in Taiwan

According to the Conservation Branch of the Forestry Bureau in the Council of Agriculture (1997:1), there are three major types of natural reserve.

The first reserve category is the Nature Preserves, based on article 49 to 54 in chapter six of the *Cultural Heritage Preservation Law 1982* (TW.), which also allows for the designation of nature preserves and ecological preserves, although no clear definitions are provided to differentiate the one from the other. At present there are 18 nature preserves and no ecological preserves. Sites are designated and announced by the Council of Agriculture. Wildlife Sanctuaries, the second reserve category, are based on article 10 of the *Wildlife Conservation Law 1989* (TW.). There are nine sites which are designated and announced by the special municipality and county or city governments. National Forestry Natural Reserves, the third reserve category, are based on article 22 of the *Forestry Law* and article 13 of the *Protection Forest Management Rules and the Revolutionary Program of Taiwan Forest Management 1976, 1990* (TW.). There are 24 sites which have been designated and proclaimed by the Forestry Bureau of the Taiwan Province Government (COA, 1997: 1). It is worthy noting that there has no marine reserve of any sort in Taiwan todate.

Chapter 3

THE FRAMEWORK OF CONTEMPORARY ORGANISATIONAL REFORM – FROM TRADITIONAL PUBLIC ADMINISTRATION TO NEW PUBLIC MANAGEMENT

3.1 Traditional public administration

Hughes (1998: 22) describes traditional public administration as an administrative regime under the formal control of the political leadership based on a strictly hierarchical model of bureaucracy, staffed by permanent, neutral and anonymous officials, motivated only by the public interest, serving any governing party impartially, and not having a major role in finalising policy but merely administering those policies decided by the politicians.

There are three main facets to political control in the traditional model of administration, particularly as it applies to Westminster systems. First, there is a clear relationship of accountability and responsibility. A department or agency has two basic roles: to advise the political leadership on the development, review and implementation of policy, and to manage its own resources so that policy

may be implemented. Second, there should be a strict separation between matters of policy, which are formally the province of politicians, and matters of administration, which are left to the public service. Third, the administration is presumed to be anonymous and neutral, not personally associated with any decisions or policies that are carried out in the name of the ministers; and non-partisan in the party-political sense and able to serve equally under any political leader (Hughes, 1998: 31). Traditional public administration is thus based on two fundamentals, the theory of disinterested bureaucratic service and the theory of separation between politics and administration. The traditional public administration model is very much based on process rather than outcomes and on setting procedures to follow instead of focusing on results (Hughes, 1998: 22).

3.1.1 Critiques of the traditional public administration

Traditional public administration confronted increasing criticism in most developed countries from the 1970s. Hughes (1998: 39, 40) sees three main problems with the traditional model. First, the model of political control was inadequate and illogical. A strict separation between politicians and administrators, and between policy and administration, was never realistic because politics and administration are necessarily intertwined. Second, the theory of disinterested bureaucratic service is no longer universally seen as

providing the technical efficiency Max Weber thought it provided (Hughes, 1998: 30). Formal bureaucracy is considered to be conducive to timeserving and not innovation; it encourages administrators to be risk-averse rather than risk-taking; and it wastes scarce resources instead of using them efficiently. Thus it has been criticised for producing inertia, lack of enterprise, red tape, mediocrity and inefficiency. Third, there was criticism from the Right as part of the argument advanced against bureaucracy as an idea, it being argued to be something that takes away freedom and to be inefficient compared to the market. It was argued that government bureaucracy greatly restricts the freedom of the individual and its power needs to be reduced in the name of 'choice'. In addition, market economists have argued that the traditional bureaucratic model does not provide a structure of incentives and rewards equivalent to that of the market. Competition, consumer sovereignty and choice provide incentives to lower costs that are argued to be absent in the bureaucratic model of administration. Therefore, it is held to be less efficient than market processes (Hughes, 1998: 46, 48).

3.2 New Public Management

In response to the inadequacies of the traditional model of administration, a new managerial approach, the New Public Management (NPM) or 'managerial' model[1] has emerged in the public sector during the 1980s and 1990s – though the transition took place gradually, and the real situation is usually a mixture of both models. Unlike traditional public administration, the two main theoretical sources of the NPM model are to be found in economics and private management (Hughes, 1998: 66). Hood (1991: 4-5) sees the NPM as comprising seven main points:

1. Hands-on professional management in the public sector. It is active, visible, discretional control of organisation from designated persons at the top, because accountability requires clear assignment of responsibility for action. This is also known as 'letting the managers manage' (Hughes, 1998: 61). Managers are recruited specifically on the match of skills to tasks. In comparison, traditional public administration privileges the seniority principle in management over merit. This results in incremental ladder-climbing and a take-no-risks approach to management.

[1] This new approach has been given different labels in academic writings: 'managerialism' (Pollitt, 1990); 'new public management' (Hood, 1991); 'market-based public administration' (Lan and Rosenbloom, 1992); the 'post-bureaucratic paradigm' (Barzelay, 1992); and 'entrepreneurial government' (Osborne and Gaebler, 1992).

2. Explicit standards and measures of performance. Hughes (1998: 61) comments that this requires goals to be defined and performance targets to be set, as accountability requires a clear statement of goals, and efficiency requires a "hard look" at objectives. In contrast, the traditional model often sets out certain procedures to be followed and does not evaluate results in relation to objectives.

3. Greater emphasis on output controls. Hughes (1998: 62) explains that resources are directed to areas according to measured performance, because of the 'need to stress results rather than procedures'. In contrast, traditional public administration tends to rely on input controls for resource allocation, rather than performance standards and measurements. Procedures are deemed more important than results.

4. A shift to disaggregation of units in the public sector. This involves the breaking up of large entities into 'corporatised units around products', founded separately and 'dealing with one another on an "arm's-length" basis'. This is justified by the need to create manageable units and 'to gain the efficiency advantages of franchise arrangements inside as well as outside the public sector' (Hughes, 1998: 62). This disaggregation breaks up the hierarchical structure of the traditional model, yet sometimes has resulted in amalgamating related agencies into integrated units according to output groups.

5. A shift to greater competition in the public sector. This involves 'the move to term contracts and public tendering procedures' and is justified as using 'rivalry as the key to lower cost and better standards' (Hughes, 1998: 62). Traditional public administration does not require clear performance standards and measures. Thus, the public sector does not face pressure from different cost-effective approaches and can sometimes operate at high cost.

6. A stress on private sector styles of management practice. This involves a 'move away from the military-style "public service ethic" to flexibility in hiring and rewarding', and is justified by the 'need to use "proven" private sector management tools in the public sector' (Hughes, 1998: 62), whereas the traditional model strictly follows the hierarchical process of recruiting and promoting public servants. This, it is held, creates an assumption of life-long positions and does not motivate public servants to improve performance.

7. A stress on greater discipline and parsimony in resource use. Hood (1991: 5) sees this as 'cutting direct costs, raising labour discipline, resisting union demands, limiting "compliance costs" to business' and is typically justified by the 'need to check resource demands of the public sector and "do more with less"' (Hughes, 1998: 62). In contrast, the traditional model normally operates on a fixed yearly budget that has often been spent to secure or gain more funding in the future. This has led to waste of resources and inefficiency and, sometimes, corruption.

Under the managerial model, corporate planning techniques specify departmental responsibilities. It is argued that program budgeting means that scarce funds can be better targeted; performance indicators allow some measure of how well targets are being achieved; and the personnel changes increase flexibility so that the most able are rewarded and the inadequate can be removed (Hughes, 1998: 78).

3.2.1 Critiques of the New Public Management

However, NPM is not immune from criticism. Arguments are made based on both theoretical and empirical criteria (Alford, 1997; Considine, 1988, 1990, 1997; Hughes, 1994, 1998; Paterson, 1988, 1997; Pollitt, 1990; Wilenski, 1988). Considine (1997: 45) argues that NPM has been given political priority by a new generation of Labor ministers who appear to hold radically different attitudes to state administration from either their predecessors or their party opponents. He also argues (1997: 93) that one of the NPM framework's major strategies is to use tight, centralised controls as a means to limit the scope of public servants and organisations dependent on public funding. This strategy often exposes client groups to direct bureaucratic control and also increases government intervention

in the voluntary or nonprofit private sector; for example, Landcare groups face control by government through the process of funding application and evaluation. This seems paradoxical in that NPM claims the breaking up of hierarchies of bureaucratic control as one of its strengths. Yet, according to Considine (1997: 93), the reality works against the idea of devolution and discretion that NPM promotes. Nevertheless, this might be avoided through appropriate planning.

Pollitt (1990: 121) argues that 'clear and limited objectives, stable and explicit priorities are very seldom the experienced reality of public service organisations'. Hughes (1998: 73) agrees, noting that it is difficult to determine objectives or to measure results in the public sector and that this is a key difference between the public and private sectors. Certainly there are benefits in identifying what the activities and objectives of agencies are, as this provides a chance to assess goal achievement (Hughes, 1998: 74). Nevertheless, public services are more distinctive than any generic model would allow, for the following reasons. Firstly, the provider/consumer transactions in the public services tend to be notably more complex then those faced by the consumer in a normal market. Secondly, public service consumers are never merely consumers, they are always citizens too, and this has a set of unique implications for the transaction (Pollitt, 1990: 126). This argument rests on the uniqueness of the public sector, in that

consumer behaviour laws do not apply there, because they are only relevant for some limited parts of what governments do (Hughes, 1998: 73).

3.3 Organisational reform in Tasmania

Before switching to a managerial model, the traditional model of public administration in Tasmania had much in common with the regime that still applies in Taiwan. The New Public Management model began to affect Tasmanian governmental agencies responsible for managing National Parks and reserves in the major departmental restructure of 1987. Its influence consolidated gradually over the next decade and culminated in the organisational reforms of 1993. These changes can be traced in the organisational charts of National Parks published in annual reports from 1972 to 1999 (appendix a). The former National Parks and Wildlife Service (NPWS) was established on 1 November 1971. This department was created under the *National Parks and Wildlife Act 1970* and retained its agency name until it was amalgamated with the former Department of Lands to form the Department of Lands, Parks and Wildlife (DLPW) in 1987. During 1971 to 1987, the structure and process of the National Parks and Wildlife Service followed the traditional public administration model, whilst the

divisions of the department have increased since 1971 through departmental expansion and extended responsibility (see table 2).

Table 2. National Parks Administration: Department Title Change 1971-2000

Year	Department Title
1971 - 1987	National Parks and Wildlife Service (NPWS)
1987 - 1989	Lands, Parks and Wildlife (DLPW)
1989 - 1992	Parks, Wildlife and Heritage (DPWH)
1992 - 1998	Environment and Land Management (DELM)
1998 - 2000	Primary Industries, Water and Environment (DPIWE)

It is worth noting that the head of the NPWS, the Director, was responsible to different Ministers from 1971 to 1987 (see table 3).

Table 3. National Parks: Ministerial Responsibility 1971 - 2000

Year	Minister in Charge
1971 - 1973	Agriculture
1973 - 1974	Tourism
1974 -1975	Education
1975 - 1976	Education, Recreation and Federal Affairs
1976 -1981	National Parks and Wildlife
1981 - 1983	National Parks and Recreational Lands
1983 - 1987	National Parks

1987 -1989	Lands, Parks and Wildlife
1989 - 1992	Parks, Wildlife and Heritage
1992 - 1998	Environment and Land Management
1998 - 2000	Primary Industries, Water and Environment

In keeping with the changes of Ministers in charge of National Parks and Wildlife Service through the period of 1971 to 1987, the functional responsibility of natural resource management of National Parks and reserves in Tasmania was shifted from agriculture, to tourism and toward education and recreation in the early years. It was later separated and gained its own niche as the National Parks and Wildlife Service in 1977.

After the 1987 amalgamation, this department was headed by a Secretary and gained a new division, Corporate Services, signalling the start of influence by the New Public Management. Nevertheless, the process and structure were still more weighted towards the traditional model. The management of National Parks and reserves took place within the Land Management Division of the department. The former Department of Lands, Parks and Wildlife was disaggregated in July 1989 to create the Department of Parks, Wildlife and Heritage (DPWH) and the Department of Environment and Planning. DPWH consisted of the Land

Management Division of the old Department of Lands, Parks and Wildlife; the Heritage Branch of the Department of Premier and Cabinet; and Administrative Services Division of the former Department of the Environment. This disaggregation and amalgamation changed the department into a more corporate structure, supported by administrative and liaison units. Under the former Department of Lands, Parks and Wildlife, the land management function was organised into three regions, and these in turn were further divided into districts and sub-districts. In 1991, The structure of Land Management Division reflected a different approach. The top layer was removed and the Division was organised into five areas of branch status. The Department of Environment and Land Management was created in 1993 by amalgamation of DPWH and the Department of Environment and Planning. The restructure of this department reflected the strong influence of the New Public Management (see table 4).

Table 4. National Parks Administration: Departmental Structure 1971 – 2000

Year	**Department Structure**
1971 - 1977	3 Divisions
1977 - 1978	4 Divisions
1978 -1987	5 Divisions
1987 - 1989	6 Divisions (including Corporate Service Division)
1989 -1990	2 Divisions + Administrative and Ministerial Support Group
1990 - 1992	2 Divisions + 2 Branches + 1 Secretariat (corporate structure)

1992 - 1993	11 divisions, 9 Outcomes, 6 Budget Programs
1993 - 1995	11 divisions, 8 Goals, 6 Budget Programs
1995 - 1996	4 Divisions, 5 Output Groups, 6 Goals
1996 - 1998	4 Divisions + 1 Office + 1 Program, 5 Output Groups
1998 - 1999	5 Divisions + 1 Group, 4 Output Groups
2000 -	6 Divisions + 1 Group, 4 Output Groups

The principal change has been to focus on the outcomes which the Agency seeks to achieve, and to link those outcomes to the programs administered by the Agency as a part of the state's budgetary process, and the structures which it had in place to deliver the outcomes. One of the outcomes, 'management of Parks, Reserves and Other Land Vested in the Department', was administered by the Divisions of Land Management and Resources, Wildlife and Heritage. Cross-Divisional co-ordination was achieved by the Public Land Management Core Business Group that comprised: the Associate Secretary (Chair); the Director, Land Management Division; the Director, Tasmanian Property Services Group; the Director, Resources, Wildlife and Heritage Division; the Director of Planning and the General Manager of the Land Information Bureau. In 1998, the Department of Primary Industries, Water and Environment (DPIWE) was formed by amalgamation of the former Department of Environment and Land Management and the former Department of Primary Industries and Fisheries.

All attributes of NPM have been fully adopted in Tasmanian with the exception of two main components. They are 'hands-on professional management' and ' a stress on private sector styles of management practice' (see section 3.2). These two attributes of NPM need to be employed – perhaps after a suitable period in which the changes are 'bedded down' - in order to accord with the whole NPM framework.

3.4 Potential adoption of NPM in Taiwan

Taiwan will undertake a major organisational reform in 2002. There is no better time to adopt NPM as a framework for reorganising environment-related governmental departments in response to the economic recession and a need to increase governmental efficiency, as 'a shift to greater competition in the public sector' and 'a stress on greater discipline and parsimony in resource use' are two of NPM's main points (see section 3.2). In addition, future reform can employ attributes of NPM into the restructure of agencies. These main characteristics are output-oriented structures, 'explicit standards and measures of performance', and the budget program concept. However, resistance to such changes in Taiwan's public sector can be predicted, for most public servants under the traditional public administration will be affected by the change in terms of stability and possible loss of benefits and entitlements.

Chapter 4

POLITICAL BACKGROUNDS: TASMANIA AND TAIWAN

It is necessary to understand the wider political contexts in order to compare the nature of resource management regimes of Tasmania and Taiwan, as political culture and structure profoundly affect planning and the implementation of natural resource management policy.

4.1 The political system in Tasmania

Jaensch (1997: 62) argues that Australia's political process is permeated by the enduring myth that it functions as a Westminster system of responsible government. In fact, Australia has a 'Washminister mutation' (Thompson, 1980) in form, and in function, 'responsible party government'. Jaensch also argues that there are two distinct interpretations of constitutionalism of relevance to Australia: the British and the American versions. American constitutionalism is based on a strong, centralised state system which is buffered by the laws and traditions of the states, and which, for all the power of the central government,

has been most successful in securing the liberty of citizens. In contrast, British constitutionalism based on separated powers and checks and balances, thereby 'hemming in' its national government, has been equally successful in securing the liberty of citizens from government interference, but in other respects has been much less successful in according liberties through government action to oppressed minorities. In many important ways, Australian constitutionalism has fallen between these two models. The Australian founders adapted the federal written constitution to Australian conditions in order to set down explicitly the disposition of powers between the states and the Commonwealth, and to establish the new institutions of federal government. At the same time, they grafted this written constitution on to British principles of constitutionalism based on the Westminster system of responsible government, which they took entirely for granted (Jaensch, 1997: 128-129).

Australian parliaments follow the Westminster axiom that the majority grouping or political party in the Lower House of Parliament forms government. In most, but not all cases, the result of an election determines the government by providing a single political party with the simple majority needed to occupy the Treasury benches (Haward, 1997: 112-113).

Christoff (1994: 350-351) states that in Australia's federal system, political responsibility for land use and resource management primarily lies with state and local government. The most significant reforms took place first at state level. During the early 1970s, most states created separate departments of conservation, responsible for environmental management, including the protection of native flora and fauna. Later, environmental issues also began to influence the federal sphere. In 1972, the Labor Government of E. G. Whitlam created a separate Department of the Environment and Conservation, as well as two Commonwealth/State ministerial councils, the Australian Environment Council and the Council of Nature Conservation ministers. In 1974, Australia became the seventh nation to ratify the World Heritage Conservation, which came into force in 1975. It subsequently signed the Convention on Wetlands of International Importance (Ramsar Convention), and joined the International Union for Conservation of Nature and Natural Resources (IUCN), the International Centre for the Study of the Preservation and Restoration of Cultural Property, and the International Council of Monuments and Sites. The Australian Heritage Commission and the Australian National Parks and Wildlife Sevices were established on the basis of these commitments (Whitlam, 1985: 547).

In 1982, the High Court upheld the Commonwealth's capacity to use international obligations to extend its power, and so established a precedent which led directly to the successful High Court defence of the Hawke Labor

Government's use of the *World Heritage Properties Conservation Act 1983* to save the Franklin River (see section 4.3), against the wishes of the Tasmanian government. After several confrontational environmental issues, major programs have developed co-operatively between Commonwealth and State governments, and relevant non-government organisations. The National Soil Conservation Program (NSCP), created in 1983, and the National Landcare Program, are cases in point (Christoff, 1994: 351, 364).

Christoff (1994: 365-366) argues that the government's role as mediator between environmental and developmental concerns has become more pronounced and more complex. Environmental issues and policy formation increasingly became a matter of federal concern, through a process of political and administrative elevation. However, most existing administrative boundaries, such as state and local government divisions, remain inappropriate to managing ecosystems. In addition, the integration of environmental concerns in all aspects of policy formation and implementation has occurred to only a slight degree. At all levels of government administration, adversarial relationships still predominate between departments and agencies established to further economic growth through resource exploitation, and those newly developed to protect the environment. These conflicts have become increasingly intense and public since 1980.

Hay (1992: 63) argues that no community anywhere in the world has had the exposure to green values and aspirations that Tasmanians have had. Tasmanian politics has been continuously dominated by environmental issues since the Lake Pedder campaign of the early 1970s (Hay and Haward, 1988: 433 - 448). Hay (1992: 64) claims that Tasmania is unique for following reasons:

1. Tasmania is the only political system in the world which is primarily focussed upon issues of the environment.

2. The environment movement in Tasmania is more visible and more prominent than anywhere else in the world, and it is impossible for Tasmanians not to have an opinion, or an evaluation, of the environment movement.

3. This has resulted in a tactical and ideological sophistication within environmental lobby groups not matched anywhere else in the world.

According to Hay (1992: 69) the fact that the battle for the Franklin-Gordon Rivers was won by the environmentalists is due largely to the structures of Australian federalism and 'the power of the Sydney and Melbourne media to transport the dispute beyond Tasmania'. Environmental politics in Tasmania are highly volatile, and environmental issues have been continuously at the head of political agenda for three decades. This is thus the world's best example of a dynamic interaction between the political system and natural resource

management that has resulted in the political agenda being dominated by environmental issues.

4.2 The political system in Taiwan

Taiwan's political system is based on the 1947 Constitution, drawn up when the Kuo Min Tang (KMT) government controlled large areas of the mainland China. The Constitution combines elements of both the Cabinet and Presidential systems of government. The main organs of government are the Presidency, the National Assembly (a constitutional council) and five governing branches: the Executive Yuan (the highest administrative governing body in Taiwan, similar to Cabinet in Australia), the Legislative Yuan (national parliament), the Judicial Yuan (the state's highest judicial organ), the Examination Yuan (which oversees the Public Service) and the Control Yuan (which exercises powers of impeachment, censure and audit).

Taiwan's political system has a four-tier structure. At the national level, Taiwan is governed by the Executive Yuan, while the Legislative Yuan is the legislative arm. The next level down is the provincial level (which excludes the two largest

cities, Taipei and Kaohsiung) presided over by the provincial governor and city mayors. The corresponding legislative arm of government at this level has been the Provincial Assembly and the city councils (provincial organs of government are now in the process of being restructured). The third tier is represented by the heads of counties and small cities, i.e. county magistrates and city mayors. County or city councils are the legislative arm at the county level, handling local administration and budgets. Township chiefs and town mayors are the lowest level of elected positions, making up the fourth tier of government. There are no elected councils at the sub-county level.

The most powerful political players at the central level are the President, the Executive Yuan and the Legislative Yuan. Final executive power rests with the President, who must sign all acts of Parliament into law. He also enjoys final authority over the military and security apparatus. The Executive Yuan, headed by a Premier and Vice-premier, is Taiwan's Cabinet. Its members are not elected representatives, but appointed officials (in the United States style).

Prior to 1987, Taiwan existed under a state of martial law. Since then, it has been engaged in a process of rapid democratisation, with full Legislative Yuan elections taking place in 1992 and 1995. Taiwan's first direct presidential election was held in March 1996 (Foreign Affairs and Trade, 1998: 7).

In contrast to the dominance of environmental politics for the past three decades in Tasmania, environmental issues have not been on Taiwan's main political agenda. There has never been a parliamentarian elected from the Green Party or on an environmentalist platform in Taiwan, whilst the Tasmanian Greens have been influential since their first representation in the Tasmanian parliament in the early 1980s. In Taiwan, the main political parties have always put development before conservation despite their proclaimed commitment to environmental policies. This is also the case with the two largest parties in Tasmania.

4.3 Environmental politics in Tasmania: A case study of the Franklin-Gordon Rivers campaign

The fate of the Franklin-Gordon Rivers has been the most important environmental issue in Tasmania to date. It could be considered a major historical turning point in natural resource management in Tasmania. The importance of this case has several facets: 1. no other environmental issue has more comprehensively dominated both Federal and State politics; 2. it featured a public 'turf war' between agencies; 3. from a local campaign it developed into a national, even an international, issue; 4. successful tactics were employed by the

environmentalists, leading to victory; and 5. it culminated in the establishment of the Tasmanian Wilderness World Heritage Area.

The significance of the Franklin-Gordon country is, as described by the House of Representatives Standing Committee on Environment and Conservation in its report to the Parliament of the Commonwealth of Australia in August 1980, that most of the Franklin and Lower Gordon Rivers region is free from human development:

> The Tasmanian National Parks and Wildlife Service divides the catchment of the Franklin and Lower Gordon Rivers into three regions, the highland country, the middle gorge and the lowland country. The Franklin and Gordon Rivers rise in the central west highlands. The Franklin River flows through alpine tarns and glacial lakes before plunging through a number of waterfalls and rapids and entering the middle gorge country. The middle gorge country is characterised by a series of narrow gorges containing numerous waterfalls and rapids. In the lowland reaches the country becomes less rugged as the river reaches become longer. Here the rivers are broadwaters flanked by thick rainforest and water-sculptured limestone cliffs. The vegetation of the region is a mosaic of rainforest, wet sclerophyll, scrub, heathland, sedgeland and swampland. Remoteness from fires and high rainfall

combine to produce widespread rainforest in many of the river and creek valleys (Parliament of the Commonwealth of Australia, 1980: 2).

The Standing Committee succinctly describes the early political developments that were to unfold into the South-West dams issue, and which induced the Tasmanian Minister for National Parks and Wildlife to appoint the South-West Advisory Committee (Cartland Committee) in November 1975. The Cartland Committee concluded that the South-West of Tasmania was an area of unique importance locally and nationally and could only increase in international importance in years to come. The report, released in August 1978, stated that it is one of the last remaining largely undeveloped temperate areas in the world and that it contains areas and features of incomparable beauty and significance. The Cartland Committee recommended, among other suggestions, that a conservation area be established to cover the whole of South-West Tasmania and that the Tasmanian Government submit a case to the Commonwealth Government for special funding for management of the area (Parliament of the Commonwealth of Australia, 1980: 2, 3). Meanwhile, the Tasmanian Wilderness Society was formed in 1976 by a group of young bushwalkers and canoeists determined to protect the remaining wild rivers of the South-West.

A three-man South-West Tasmania Committee was appointed in June 1979 to advise State Cabinet on land-use matters relating to the South-West. The Department of the Environment was instructed to advise the Hydro-electric Commission (later the Hydro-electric Corporation, see chapter 5) as to the guidelines it should use in preparing an environmental impact assessment of its proposals. In practice the Department could not direct the Hydro-electric Commission to prepare an impact statement because the Commission was not subject to the *Environmental Protection (Impact of Proposals) Act 1974*. From 1944, the Hydro-electric Commission had been an autonomous statutory authority almost entirely responsible for its own affairs (Lowe, 1984: 6). It was neither directed by nor responsible to the Minister, although 'the Minister administering the Hydro-electric Commission' was answerable in parliament for its activities. The Commission was a trading or business organisation. The Tasmanian National Parks and Wildlife Service, by contrast, held that the Gordon and Franklin Rivers were an integral part of the South-West wilderness. The Service tabled a report in November 1979 seeking the establishment of a major Wild Rivers National Park in the very areas the Hydro-electric Commission was claiming for power development (Davis, 1981: 229, 233, 234).

However, the Hydro-electric Commission was determined to develop the hydro-electricity potential of the Lower Gordon and Franklin Rivers. The development proposal consisted of two schemes, the first of which would have harnessed the

combined flow of the Gordon and Franklin Rivers in a power station just downstream from the Gordon and Franklin junction. The second stage of the scheme would have developed the further potential of the King and Franklin Rivers in a power station located on the Franklin River. On 16 October 1979 the Hydro-electric Commission tabled its report, *Report on the Gordon River Power Development Stage Two*, in the Tasmanian Parliament and recommended that the first stage of the development proceed. This was to consist of a concrete faced rock-filled dam 105 metres high, one kilometre downstream of the Franklin-Gordon Rivers junction, a concrete spillway, and a power house with an installed capacity of 296 megawatts. The dam would have resulted in a reservoir extending up the Gordon River valley for thirty-six kilometres and up the Franklin River valley for thirty-five kilometres (Parliament of the Commonwealth of Australia, 1980: 5).

After the *Report on the Gordon River Power Development Stage Two* was released, interested parties were asked to forward their comments to the Directorate of Energy, which serviced the Energy Advisory Council, so that the Government could take account of all relevant information before reaching its decision. A Co-ordination Committee on Future Power Development was established to process submissions and consider any comments by government departments and authorities, the conservation movement and other interested bodies. The Co-ordination Committee comprised the Director of Energy, the

Director-General of Lands, the Director of Environment Control and the Development Officer of the Department of Planning and Development. Over 480 comments were received by the Committee, of which only ten favoured the Hydro-electric Commission proposals or were neutral to them. The Mines Department challenged a number of statements in the Hydro-electric Commission's report, because the discovery of more extensive coal deposits within Tasmania made coal-fired thermal power a viable option, whilst the Commission continued to insist that operational costs for a thermal station would be prohibitive. The Commission forced the withdrawal of certain Mines Department evidence, following claims of errors and prospective libel suits (Davis, 1981: 234, 237, 239).

The Co-ordination Committee on Future Power Development's report was released in May 1980. The principal recommendation was against the Hydro-electric Commission proposals. Furthermore, the Department of the Environment released a report, *Hydro-electric Development and Wilderness in Tasmania* in November 1979 (Kirkpatrick, 1979); and the National Parks and Wildlife Service released *Review of the Hydro-electric Commission Report on the Gordon River Power Development Stage Two* in January 1980. Both reports were highly critical of the Hydro-electric Commission's environmental impact assessment. The South-West Tasmania Committee also released the *Report on the Proposed Hydro-electric Power Development in South West Tasmania* in July 1980,

arguing against further hydro-electric development in the South-West (Davis, 1981: 239). In addition, on 8 July 1980, the Australian Heritage Commission announced the listing of South-West Tasmania in the register of the National Estate. This annunciation had no binding effect in law, but placed moral suasion on the state and Commonwealth governments to safeguard the area (Parliament of the Commonwealth of Australia, 1980: 2, 3).

Meanwhile, the Tasmanian Wilderness Society grew rapidly and soon had a hard-working volunteer base operating full time in Hobart. At a consultative meeting with other environmental bodies a division of labour was agreed upon, with the Tasmanian Conservation Trust and the Australian Conservation Foundation providing essential research support. A series of promotions and audio-visual presentations were employed to generate funds and convey the Society's message to the public. The Wilderness Society worked hard to persuade the public in favour of energy conservation, co-generation, thermal options and power schemes outside the South-West, at the same time arguing that although industry was getting low cost energy it was not solving Tasmania's unemployment problems. The Wilderness Society and its supporters conducted one of the largest street marches ever held in Tasmania, with 6000-10000 persons participating. Similar rallies were held in other states. This was an indication that the conservation cause was united and enjoyed good community

support, and considerable pressure was brought to bear on government (Davis, 1981: 232, 233, 239, 240).

Despite all the views against the flooding of the Franklin and Lower Gordon River, work camps of the Hydro-electric Commission were established in the heart of the south-west wilderness. Major site-clearing and advance party groups moved into the area with little or no prior environmental impact assessment (Lowe, 1984: 171). Employees of the Hydro-electric Commission also formed the Hydro Employees Action Team, and the Commission's staff were levied to fund an advertising campaign against the demands of the conservationists. Another pro-dam group largely funded by industry contributions, the Association of Consumers of Energy, was created to support Hydro-electric Commission. Through late 1980 and into 1981, the confrontation between pro-dam groups and conservationists intensified and in the end it was value judgments and political considerations which were debated, rather than economic realities or social or environmental factors (Davis, 1981: 240, 241).

At the Commonwealth level, by the end of August 1982, the Federal Government had been advised that it possessed the constitutional power to stop the dams being built. Section 51 of the Australian Constitution, which endowed the Commonwealth government with the right to make laws in respect of

external affairs matters, provided the legal grounds for intervening in the Tasmanian dams dispute. This was relevant because the proposed dams were to be sited in a proposed World Heritage Area, for which a nomination had already proceeded, in accordance with an international treaty to which Australia was a signatory. The Tasmanian Wilderness Society was now active in the key marginal electorates of Sydney and Melbourne, pressuring the Federal Parliament to take a stand against the Tasmanian Government and in favour of confirming the Franklin-Gordon Wild Rivers National Park. In mid-August 1982, The Wilderness Society embarked on a national campaign to focus attention on the need to stop development activity in the Franklin-Gordon Wild Rivers National Parks (gazetted on 31 March 1981). The Wilderness Society coordinated the blockade of the south-west rivers which brought together hundreds of people from both inside and outside Tasmania, representing a vast cross-section of society from differing social, economic and philosophical backgrounds. No Federal Government would have been able to ignore this nationally publicised event which ran for a number of weeks without violence and with a commendable degree of understanding being shown by Tasmanian police officers when arresting hundreds of protesters for trespassing in the region. On 14 December 1982, the World Heritage Committee officially listed the Tasmanian south-west as a World Heritage Area on the World Heritage List in accordance with the 1972 UNESCO Convention. Pressure was now firmly on the Federal Government to act in accordance with its obligations under the UNESCO Convention (Lowe, 1984: 171, 173).

Following the federal election of 3 February 1983, a new Australian Government, one bound to a pre-election commitment to ensure that the south-west wilderness region was secured for all time, was elected. On 30 March 1983, the World Heritage Regulations were introduced. Thus were the first formal steps taken by the Federal Government to effect the cessation of the Gordon below Franklin Power Development Scheme. The *World Heritage Properties Conservation Bill* was introduced into the Federal Parliament on 21 April 1983, and became law on 20 May 1983. A High Court hearing was commenced on 31 May 1983, and on 1 July 1983 the High Court ruled that the Gordon below Franklin dam could not go ahead and that the Commonwealth's powers to enforce the World Heritage listing, and its obligations to protect that listing under the UNESCO Convention of 1972, were absolute (Lowe, 1984: 174, 175).

4.4 Environmental politics in Taiwan: A case study of the Chilan Formosan Cypress Forest campaign

The conservation of the Chilan Formosan Cypress Forest is the most recent and important environmental issue in Taiwan. The importance of this issue rests on several facets: 1. It is the first environmental campaign that has involved both central and provincial politics; 2. there was a 'pen war' between academics; 3.

the regional campaign developed into a nationwide issue; 4. environmentalists carefully selected tactics to achieve their goals; and 5. it proposed the first National Park to be managed by aboriginal people.

Formosan Cypress, *Chamaecyparis obtusa* Sieb. et Zucc. Forma *formosana* Hay. (Hayata, 1908: 260; Lee, 1962: 1-16), is a tall (the average height is about 30 to 40 metres and it can reach 60 metres high) and slow growing (it will take about 350 to 400 years to reach a 50 centimetre diameter near the base of the trunk and has a growth rate of one cubic metre per 320 years) coniferous evergreen tree with tremendous commercial value because of the fragrance and durability of its timber. It is one of the very few (and the most profitable) timbers that is still harvested and exported, most notably to Japan for building, where it has been used in the grand shrine-gate and a gigantic statue of Buddha. The Chilan Forest is the last remaining large area of native Formosan Cypress after hundred of years of logging in Taiwan. Located in northern Taiwan, the Chilan Formosan Cypress Forest covers an area of 20000 hectares, the only one of such size left on earth. It is located at the upstream of Lanyang river valley and on the top of the mountain range across Taoyuan, Hsinchu and Ilan counties as part of a larger 45851-hectare Chilan Forest. This mid-altitude (altitude between 1200 and 3300 metres above sea level) forest receives abundant moisture from the eastern-northern cold fronts in winter and the western-southern monsoons in summer that form Taiwan's all-year, humid fog forest. Situated in Taiwan's highest rainfall

area, it is one of the most important forests for soil and water conservation in Taiwan. The Chilan Formosan Cypress Forest has existed on Taiwan without human intervention for hundreds of centuries and is an old growth forest ecosystem dating from the glacial period. It meets all the qualifications to be included in the World Heritage List of the UNESCO (http://tean.formosa.org/campaigns/forestry/index.html).

In addition, situated at the upper stream of the Shihmen Dam, the forest is the source of water for five northern counties in Taiwan. Almost half of Taiwan's population and ecosystems depend on this water source. However, the government has not seen fit to protect this indispensable life support system. In 1959, the government assigned the Veterans Administration as the operational agency to manage Chilan forest to provide jobs for the reserve forces. For many decades before the environmental movement began, the operational agency has allowed clear felling without regulation, causing the forest to shrink in size. In October 1991, environmentalists successfully lobbied for legislation to stop logging in native forests, but the government's regulations contain too many loopholes, and the enforcement has been lax. The operational agency claims to "clean up" the forest by cutting down and removing whichever trees it deems unfit to survive. Yet, in reality, this is illegal logging.

In July 1995, the Taiwan Provincial Legislative Assembly (provincial parliament) assigned a fifteen-man investigation team to Chilan forest. The team

reported to the Taiwan provincial government in October 1996 that the management of Chilan forest was not appropriate. In January 1997, the Forestry Bureau (provincial agency, see chapter 5) organised a site visit with related agencies to plan a special code of practice for the operational agency. In May 1997, the Council of Agriculture (central agency, see chapter 5) ratified the code of practice for the operational agency. In October 1997, the Veterans Administration invited pro-logging experts for site investigation and suggested that the code of practice should be modified to suit the operational agency. In December 1997, the Taiwan provincial government tabled the *Chilan forest management plan* to the Taiwan Provincial Legislative Assembly. In May and August 1998, the Coalition for Conservation of Ecology, a NGO, visited the Chilan forest. In September 1998, a member of the Taiwan Provincial Legislative Assembly asked the Forestry Bureau to provide a formal management plan and code of practice for Chilan forest, yet did not received a formal reply. In October 1998, the conservation organisations protested to the Forestry Bureau. In November 1998, the Forestry Bureau replied to the Coalition for Conservation of Ecology that the case had been transferred to the Council of Agriculture. Meanwhile, the Centre for Studies of Taiwan Ecology, a NGO, and media reporters visited Chilan forest for investigation and subsequently published articles in newspapers and magazines. On 21 December 1998, the Coalition for Rescuing Chilan Forest conducted a press conference to launch their campaign and since then has debated with the Veterans Administration, with pro-operation academics and with the Council of Agriculture on television and in other media.

The Coalition for Rescuing Chilan Forest promoted conservation through public lectures, street plays and collecting petitions. Meanwhile, the Council of Agriculture invited members of the Legislative Yuan (national parliament) to investigate Chilan forestry. It also documented illegal logging actions. The Council announced that they would put future operations on hold but would not change the present management of the Chilan forest.

On 27 December 1998, the biggest street rally in the history of conservation in Taiwan, about 4000 people from all over Taiwan, protested in Taipei. On New Year's Eve, 1999, protesters assembled overnight in eight cities simultaneously to support the conservation of the Chilan forest. In January 1999, the Veterans Administration invited a pro-development member of Legislative Yuan to visit Chilan forest in support of future operations, but the Premier instructed the Council of Agriculture and the Veterans Administration to stop logging the Chilan forest by June 1999, at the end of the then current management plan. In February 1999, the Coalition for Rescuing Chilan Forest and members of Legislative Yuan visited the Council of Agriculture, and the section head of Department of Forestry of the Council announced that the operation of Chilan forestry would cease in June 1999. In March 1999, the head of the Council of Agriculture proclaimed that the decision on future practice in the Chilan forest would be made after more discussion with experts and investigation from NGOs.

In the meantime, hundreds of workers had been prosecuted for illogical logging, and two members of the Judicial Yuan (the state's highest judicial organ) had investigated illegal logging in the Chilan forest. Developments began to follow hard upon each other. In April 1999, conservationists persuaded members of the Legislative Yuan to cut the budget for the operation of the Chilan forest and the Vice-Premier declared that there would be no future operations in the forest. Meanwhile, the employees of the Veterans Administration (none of them are veterans) protested outside the Legislative Yuan. In May 1999, the Defence Committee of the Legislative Yuan, a pro-operation committee, reinvestigated logging operations in the Chilan forest. In August 1999, a pro-conservation member of the Legislative Yuan organised a public hearing about the Chilan forest operation. In October 1999, pro-operation academics from the Forestry Department of the Taiwan National University and the Soil and Water Conservation Association held a conference to support the Veterans Administration. Meanwhile, the conservationists protested outside the Council of Agriculture against changing the decision to cease operations. In November 1999, the Council of Agriculture held a meeting to evaluate operations in the forest.

Chen, Y. (1998; 1999; 2000) argues that the only feasible solution to conserve this area in the long run is to have Chilan Forest and its surrounded areas declared a National Park. This would be a National Park managed by aboriginal

people, the first in the history of Taiwan, with the multiple functions of environmental conservation, research, and education. More than 100000 signatures on a petition from environmental groups and individuals have been collected in support of this campaign. Magistrates and mayors of four counties and two cities surrounding the forestry, including Hsinchu, Taipei, Ilan, Taoyuan Counties and Keelung and Taipei Cities, have also given their endorsement to this campaign. Because of these actions, the Council of Agriculture stopped a planned "clean up" project, and the forest has been temporarily saved. Yet the Chilan forest is not safe because the operational agency is attempting to revive its plan to harvest again. The National Coalition for Facilitating the Establishment of Chilan Formosan Cypress National Park (a Non-government Organisation formed from many groups all over Taiwan) continues to urge the Executive Yuan (the highest administrative governing body in Taiwan, similar to Cabinet in Australia) to approve the proposal of Chilan Formosan Cypress, or Ma-gao (the pronunciation of that area by local aboriginal people) National Park (National Coalition for Facilitating the Establishment of Chilan Formosan Cypress National Park, 2000: 160 – 165).

4.5 Comparison of Tasmanian and Taiwanese case studies

There are several similarities and several differences between the two environmental campaigns that have been described above. These are summarised in table 5, below.

Table 5. Comparison of campaign case studies: Taiwan and Tasmania

	TAIWAN	TASMANIA
Campaign	Chilan Formosan Cypress Forest	Franklin-Gordon Wild Rivers
Government level involved	Central and Provincial	Federal and State
Rival camps	'turf wars' between governmental agencies	'pen wars' between academics
Scale	Local to national	Islandwide to nationwide
Tactics	Parliamentary politics, street protests, petitions, NGOs coalition, media	Parliamentary politics, street protests, NGOs coalition, media
Outcome	Proposal for the first National Park managed by aboriginal people in Taiwan	Establishment of the first World Heritage Area in Tasmania

Both cases involved multiple levels of government. The Franklin-Gordon Rivers victory was effected through the intervention of the Australian Federal Government which prohibited the Tasmanian government undertaking hydro-electric development in the World Heritage Area. This was based on interpretation of the Australian Constitution and Australia's international legal obligations as a signatory to a UN Convention, as determined by the High Court. The saving of the Chilan Formosan Cypress Forest was temporally achieved through an investigation held by the Provincial Legislative Assembly at first and

then finally a decree to stop further logging from the Central Government. The difference in the two cases is that there was a dispute between the Australian Commonwealth and Tasmanian state governments, whilst in Taiwan, the provincial and Central Governments were jointly affected by pressure from the environmentalists, and were not themselves in conflict.

In both cases rival coalitions formed to fight for their goals. The significant difference is that in Tasmania the 'turf wars' were between governmental agencies. The Hydro-electric Commission was challenged by the Mines Department, Department of the Environment and the National Parks and Wildlife Service. Whilst there was no governmental agency in Taiwan to support conservation, there were still vigorous debates, 'pen wars', between academics belonging to the two camps. For example, the Coalition for Rescuing Chilan Forest (latter transformed to the National Coalition for Facilitating the Establishment of Chilan Formosan Cypress National Park) was largely based on Dr. Y. Chen's professional recommendations in its debates with pro-logging academics.

In each case, both sides attracted considerable support across society, breaking down the regional barrier and transforming the issue into a national one. The historic 6000–10000 strong street rally in Hobart, similar events in other cities in

Australia, and the hundreds of protesters blocking the development site received saturation coverage in the media. This put enormous pressure on both the Australian Commonwealth and the Tasmanian state governments. In Taiwan, history was also made, with 4000 persons islandwide gathering in Taipei and marching in condemnation of the logging operation. More then 100000 signatures were collected from the public, representing a vast cross-section of society from differing social, economic and philosophical backgrounds in support of the establishment of a National Park to conserve the Chilan Formosan Cypress Forest. In addition, endorsements from surrounding local governments and the Taipei municipal government also provided strong pressure upon the Central Government to establish the proposed National Park.

Both cases demonstrate the strength of cooperation between like-minded NGOs and the collaborative political tactics that were employed to pursue a conservationist goal. The Tasmanian Wilderness Society was backed by the Tasmanian Conservation Trust and the Australian Conservation Foundation in essential research support, and in activities organised nationwide. In addition, the Tasmanian Wilderness Society approached members of different parties in the Federal Parliament and persuaded politicians to endorse the campaign of saving the Franklin-Gordon Rivers, thereby counteracting the pro-development position of the Tasmanian government. In Taiwan, the Centre for Studies of Taiwan Ecology, led by Dr. Y. Chen, provided the requisite academic expertise and

practical support to challenge the pro-logging academic camp. The Rescuing the Chilan Formosan Cypress Forest campaign was initiated by a group of NGOs that formed the Coalition for Conservation of Ecology and later combined with other NGOs to found the Coalition for Rescuing Chilan Forest. When the Chilan Forest was temporarily saved, NGOs started the National Coalition for Facilitating the Establishment of Chilan Formosan Cypress National Park to coordinate efforts in a way that strengthened the cohesiveness of the conservation movement. The Coalition sought support from members of different parties in the Legislative Yuan to reject the logging plan and raised rare concern among national politicians about a conservation issue that has led to a currently insecure victory (National Coalition for Facilitating the Establishment of Chilan Formosan Cypress National Park, 2000: 98).

Both cases constitute milestones in conservation history. While it was not the original intention of environmentalists, the Tasmanian Wilderness World Heritage Area became the first WHA in Tasmania. This establishment guaranteed the safety of the Franklin-Gordon Rivers and brought about the first example of Federal intervention to stop a major development project in Tasmania. Although the proposal to create the first National Park managed by aboriginal people in Taiwan has not yet been approved, the Rescuing the Chilan Formosan Cypress Forest campaign stimulated debate on natural resource management and the involvement of aboriginal people. This also proved a

successful strategy, and should allow future environmental campaigns to proceed with efficiency and eventual success.

The Franklin-Gordon Rivers campaign had great influence on both political culture and administrative change in Tasmania, although it was not the first major dispute between development and conservation. The Lake Pedder campaign of the early 1970s, in which environmentalists sought unsuccessfully to save Lake Pedder from flooding for hydro-electric power development was the first such controversy. This issue strengthened the environment movement, placing environmental issues permanently at the head of Tasmania's political agenda (Hay, 1992: 69), such that they have dominated Tasmanian politics ever since. In addition, decision-making processes within Tasmanian government have been altered to take increased account of conservation in natural resource management. Furthermore, environmentalists can and have become directly involved in the parliamentary process, several having secured election in 1989 and 1994 and achieving the balance of power in the Tasmanian House of Assembly.

Similarly, the final result of the Chilan Formosan Cypress Forest campaign will be a key indicator to the future of environmental issues in Taiwan. If the Chilan Formosan Cypress National Park is established, it will be the first National Park

that was initially proposed by NGOs. All existing National Parks were proposed and planned by the government. Should the government establish a well planned National Park that genuinely involves aboriginal people in its management and conserves the precious Formosan Cypress Forest, this would change the political culture in a more environmentally-conscious and democratic direction. Even if the campaign fails, environmentalists will have learned strategic lessons and thus have improved their prospects for success in the future.

Chapter 5

TERRESTRIAL ENVIRONMENT-RELATED GOVERNMENTAL DEPARTMENTS

Australia has a federal political system, with the powers of the Commonwealth defined in the Constitution, and the 'residual' powers belonging to the states and territories. The Commonwealth government only has power in environmental matters where international treaties are involved. Power can be legal or informally coercive, with control of funds as one form of coercion. Apart from funding from the Commonwealth government to manage a World Heritage Area and supporting some research projects in Tasmania, and following the *Inter-Government Agreement on the Environment*, the Tasmanian state government holds sovereign power and responsibility for environmental management. A third tier of government, local government, is the smallest and most basic unit with environmental management responsibilities.

At present the Republic of China rules the major islands of Taiwan, Penghu, Kinmen, and Matsu, and other minor islands. Most countries, and the United Nations, recognise the Peoples' Republic of China's claim over Taiwan. Thus, international treaties do not apply in Taiwan. Despite this, there is a very close

informal relationship between many countries and Taiwan, especially in trade, science and cultural exchange.

Although Taiwan has not signed international treaties, these treaties may effectively be imposed by potential trade sanctions, as in the case of the Convention on International Trade in Endangered Species (CITES), and through the creation of wildlife protection regulations in Taiwan. On March 25, 1994, the CITES concluded at its standing committee meeting in Geneva that Taiwan had not conserved endangered species at the minimum level and it recommended that further clear progress be demonstrated by the time of next meeting. Following the decision by the CITES, the United States imposed trade sanctions on a list of Taiwan wildlife imports prohibited under the Pelly Amendment to the *Fisherman's Protective Act* in April 1993 (Government Information Office, 1995: 246).

The administrative system in Taiwan was, until recently, a four-level structure: central, provincial/municipal, county and district government, but the provincial government gradually relinquished its power and responsibility to other levels of governments and was finally abolished in the major 1998 reform of the structure of government.

5.1 Terrestrial environmental management-related government departments in Tasmania

This section describes the different responsibilities of government agencies at different levels in Tasmania for environmental management.

5.1.1 Commonwealth government level

There is no direct involvement by the Commonwealth in day to day environmental management in Tasmania except that the management budget for World Heritage Areas is mainly provided by the Commonwealth government. The Tasmanian Department of Primary Industry, Water and Environment (DPIWE) administers World Heritage Areas.

The Commonwealth government also provides funds for improved environment management and for conservation programs to governmental agencies and non-government organisations in Tasmania. Sole implementation of environmental management by the state government makes for policy and enforcement consistency, with duplication and wasted manpower minimised.

5.1.2 State government level

Over the last thirty years, the departmental structure of the Tasmanian state government has changed several times. The agencies charged with environmental management in particular were significantly changed (appendix a). At present, the agencies directly involved with environmental management are the Department of Primary Industry, Water and Environment; Forestry Tasmania; and the Hydro-electric Corporation.

This section describes these governmental agencies in terms of their responsibilities and gives an overall picture of their role in environmental management in Tasmania. It applies to the situation in 2000.

5.1.2.1. Department of Primary Industry, Water and Environment

The Department of Primary Industry, Water and Environment (DPIWE) is the major environmental management agency within the Tasmanian bureaucracy. It has prime responsibility for environmental management in Tasmania. It is the product of an amalgamation of the former departments of Primary Industry and Fisheries and Environment and Land Management in the wake of a change in the political complexion of state government in late 1998.

Under the Department of Primary Industry, Water and Environment there are six divisions: Information and Land Services; Environment, Planning and Scientific Services; Resource Management and Conservation; Food, Agriculture and Fisheries; Corporate Services; and Strategic Issues and Program. The Division of Information and Land Services has seven branches. They are Government Valuation Services; Survey Operations; Land Data Registration; Geo-data Services; Corporate Information Technology; Service Tasmania Operations; and Property Tasmania (http://www.dpiwe.gov.au/chart.gif).

The goal of the Information and Land Services Division is to provide the integrated land and geographic information necessary to support economic growth whilst protecting the social and environmental interests of Tasmania (Tasmanian Department of Environment and Land Management, 1996: 15). The Division is thus responsible for surveying systems and services, valuation systems and services, land information systems and services, land titles systems and services, and land information coordination (Tasmanian Department of Environment and Land Management, 1996: 15).

There are five branches within the Division of Environment, Planning and Scientific Services. These are Operations, Analytical Services, Forensic Services,

Planning Services, and Scientific and Technical (http://www.dpiwe.gov.au/chart.gif). The goal of the Division of Environment, Planning and Scientific Services is to ensure and facilitate the fair, orderly and sustainable use and development of Tasmania's natural and physical resources. Its responsibilities are environmental management and pollution control, the provision of integrated land use planning services and the conduct of public land use inquiries (Tasmanian Department of Environment and Land Management, 1996: 15), and it administers the Acts relevant to these functions.

There are six branches in the Division of Resource Management and Conservation: Integrated Policies and Strategies, Land and Water Management, Nature Conservation, Cultural Heritage, Crown Land Services, and the Parks and Wildlife Service. Of these branches, the one with the most crucial natural reserve management responsibilities is the Parks and Wildlife Service. It consists of four sub-branches: Nature Conservation, Conservation Strategies, Cultural Heritage, and Business Services (http://www.dpiwe.gov.au/chart.gif).

The Parks and Wildlife Service branch is the agency responsible for:

- conservation and management of Tasmania's native animals and plants; scenic landscapes and wilderness; geological features, including caves; and historical and Aboriginal heritage;

- management and maintenance of land for public recreation;

- implementation of the *National Parks and Wildlife Act 1970, Aboriginal Relics Act 1975, Crown Lands Act 1976, Whales Protection Act 1988, Threatened Species Act 1995*, and administration of the *Ida Bay Railway Act 1977*[2];

- investigation, presentation and interpretation of natural, historical and Aboriginal heritage in Tasmania, protection of that heritage and rehabilitation of it where necessary;

- management of the Tasmanian Wilderness World Heritage Area and the services necessary for visitors to enjoy and benefit from National Parks and other types of reserved land in Tasmania;

- providing accurate information and professional and reliable advice to the Minister for Conservation and Land Management and the state government, and for implementing government policy; and

- managing the use and enjoyment of Tasmanian wildlife in humane and sustainable ways (Department of Parks, Wildlife and Heritage, 1992, Corporate Plan, 3).

---

[2] Ida Bay Railway is a privately operated scenic railway, the southernmost in Australia, which runs through historical and natural wilderness sites. This Act regulates the management of the railway for the maintenance of the heritage values of the area.

The Crown Land Services branch manages all unalienated government land - not just for environmental purposes, but also potentially for development.

The joint goal of the Crown Land Services and the Parks and Wildlife branches is to provide for the conservation, management and protection of Tasmania's natural, cultural and environmental assets. The Parks and Wildlife, and Crown Land Services branches have responsibility for National Parks and public land management, and for conservation of Tasmania's flora, fauna, geo-heritage, and cultural heritage (Tasmanian Department of Environment and Land Management, 1996: 15). Other divisions have less central environmental responsibilities.

The goal of the Property Tasmania branch is to provide for the effective management, protection, development and disposal of Crown property[3] (Tasmanian Department of Environment and Land Management, 1996: 15). While responsibilities have not substantially changed, there was considerable internal restructure involved in the creation of DPIWE, and, the Property

[3] Crown property is the term for government owned public property in Australia. Currently, with the state facing major budgetary pressures, the government has embarked upon a program of developing or selling public property.

Tasmania branch, which was previously under the equivalent Resource Management and Conservation division is now located under the Information and Land Services division.

Under the branch of Land and Water Management are the Catchment Management, Water Resources Management and Resource Assessment sub-branches, and the National Landcare Program Unit. This branch is the most directly involved with natural resource management. The branch assesses, monitors, and regulates the land and water resources of Tasmania. It provides reports and expert advice on the sustainable use of Tasmanian natural resources. Its aims are to manage water catchment areas to ensure the optimal use of Tasmanian land and water resources, regulate the use of water from rivers and lakes, monitor water quality and stream-flow and develop agricultural sustainability and capability indicators (Department of Primary Industry and Fisheries Tasmania, 1996: 7). The branch of Land and Water Management also plays an important role in helping communities and farmers by administering the National Landcare Program and supporting various local Landcare groups under that program[4]. In 1996/97, the National Landcare Program granted $3.71 million to community groups, state agencies and other bodies in Tasmania for projects

[4] The National Landcare Program is a Commonwealth government funded national project to improve environmental management by way of tackling land degradation problems at the local community level.

like Farmwi$e[5], land and water resource assessments and catchment management (Department of Primary Industry and Fisheries Tasmania, 1996: 7).

The Division of Food, Agriculture and Fisheries does not have environmental management as its prime function, but does have responsibility for the environmental implications of agricultural practices. The division has six branches. The branches are Marine Resources, Agriculture, Food Quality and Safety, Regional and Business Support, Diagnostic Services, and Quarantine Barrier Services (http://www.dpiwe.gov.au/chart.gif).

The branch of Marine Resources is responsible for the sustainable management and maximum economic development of Tasmania's living marine resources. This branch develops management plans and regulatory frameworks for natural resources and the marine farming industries to ensure sustainable resource use. It also develops aquaculture and fisheries industry development strategies and plans (Department of Primary Industry and Fisheries Tasmania, 1996: 8).

[5] Farmwi$e is a program to inform and help farmers to improve farming practice for better environmental management.

The most recent revision of fisheries legislation, culminating in the *Living Marine Resources Management Act 1995* and the *Marine Farming Planning Act 1995*, provides a protection regime for marine resources that is even stronger than the *National Parks and Wildlife Act 1970*, because the latter Act cannot regulate fishing activities in marine reserves, though it can be used to declare such reserves. The *Living Marine Resources Management Act 1995* has the power to both declare reserves and set regulations, including the banning of fishing.

The branch of Agriculture provides advisory and information services through the Crops and Horticulture sub-branches; diagnostic, analytical and certification services, and advice on diseases, weeds, and agricultural and veterinary chemicals. It also facilitates the development of industry sector plans and activities to enhance exports of Tasmanian primary products (Department of Primary Industry and Fisheries Tasmania, 1996: 9).

On this side of the new agency, too, responsibilities have not greatly changed, though there has been considerable internal restructure since the inception of DPIWE. For example, the branch of Land and Water Management was under the equivalent division of Food, Agriculture and Fisheries but now is under the division of Resource Management and Conservation.

Outside the formal structure of the Department of Primary Industry, Water and Environment, there are four statutory and/or quasi-judicial organisations: the Resource Management and Planning Appeal Tribunal; the Public Land Use Commission; the Board of Environmental Management and Pollution Control; and the Land Use Planning Review Panel, which are resourced by the Division of Environment, Planning and Scientific services and are also under the jurisdiction of the Minister for Primary Industry, Water and Environment (Tasmanian Department of Environment and Land Management, 1996: 14).

There are four other quasi-independent statutory organisations resourced by the Resource Management and Conservation Division: the Inland Fisheries Commission; the Royal Tasmanian Botanical Gardens[6]; the Ben Lomond Ski Field Management Authority[7]; and the Wellington Park Management Trust[8]. There is also a Corporate Support Division to assist the Minister for Primary Industry, Water and Environment (Tasmanian Department of Environment and Land Management, 1996: 14-15).

---

[6] The Royal Tasmanian Botanical Gardens is a government managed botanical garden that includes vegetation and flora conservation, research and public environmental education among its aims.

[7] Ben Lomond Ski Field is located in the Ben Lomond National Park in Tasmania and requires a ski field's specialised management during the ski seasons in winter.

[8] Wellington Park is equivalent to a National Park but was given its own act to facilitate potential tourism development, including a cable car.

5.1.2.2 Forestry Tasmania

Although the main focus of Forestry Tasmania is to maximise timber yield and timber by-products, it holds a major responsibility for environmental management within Tasmanian forests.

Forestry Tasmania has a managing director who supervises three general managers and also is responsible for the Division of Corporate, Public Affairs and Internal Audit. The Forestry Management General Manager is responsible for the Division of Forest Management, the Division of Silvicultural Research and Development, and Conservation and Community Services. The Operations General Manager is responsible for the Southern and Northern Region[9], fire management, plant and stores and engineering. The Commercial Manager is responsible for the Native Forest Program and Softwood Program (Forestry Tasmania, 1996: 13).

The Conservation and Community Services Program is responsible for providing policy advice on conserving the natural and cultural heritage of State Forest. It is also responsible for providing and managing forest information, and for

[9] The management of forest resources is divided into a Northern Region and a Southern Region in Tasmania.

recreation and tourist-based visitor programs to State Forests, as well as developing school based forest education programs and services. This program has a legislated responsibility to oversee the delivery of non-wood values of multiple-use forest land management and related products and services in a sustainable manner for maximum benefit to the state and the community under the *Forestry Act 1920* (Forestry Tasmania, 1996: 28).

The Division of Forestry Management is responsible for:

- providing forest management policy and advice; maintaining resource inventory data and analysis systems to provide information about forests and associated lands for the purpose of management, planning and decision support;
- planning evaluation services related to forest management; and
- undertaking biometrics research to support forest management and forest silviculture functions (Forestry Tasmania, 1996, 30).

The Division of Silvicultural Research and Development is responsible for conducting forest conservation and silvicultural research towards:

- improving operational performance;

- incorporating research results into field practice;
- providing statewide coordination of silvicultural operations; and
- managing the Perth Nursery and the Tasmanian Seed Centre (Forestry Tasmania, 1996: 32).

This Division is represented on several state and national committees. For example, it is represented on the Research Priorities and Coordination Committee, and the Endangered Species, Biodiversity and Genetic Resources Working Groups, all of which operate under the direction of the Standing Committee on Forestry (Forestry Tasmania, 1996: 33).

There are four branches under the Division of Silvicultural Research and Development: the Biology and Conservation Branch, the Field Services Branch, the Native Forests Branch, and the Plantation Branch. The Biology and Conservation Branch is responsible for:

- conducting research on forest biology and conservation;
- ensuring research findings are utilised to increase the productivity of production forests and/ or ensuring ecologically sustainable forestry;
- providing advice on pest and disease management; and

- providing advice on conservation management of reserves and production areas (Forestry Tasmania, 1996: 33).

The Field Services Branch is responsible for coordinating field operations, development of specialised equipment and appropriate techniques in line with world best practice, and assistance to field staff with maintenance of operational standards, including all aspects of forest aviation (Forestry Tasmania, 1996: 33).

The Native Forestry Branch is responsible for performing research and providing information on the implementation of silvicultural systems in native forests (Forestry Tasmania, 1996, 34), whilst the Plantations Branch is responsible for providing prescriptions and advice on the establishment and management of plantations of pine, eucalypt, blackwood and other species (Forestry Tasmania, 1996: 34).

5.1.2.3 Hydro-electric Corporation

The Hydro-electric Corporation is a governmental enterprise which has considerable control over its own water resource activities, within certain

economic and social constraints. It provides clean electricity for Tasmania but also has been criticised for its past dam-building practices, such as its determination to resist public outrage and flood Lake Pedder, a balanced shallow lake ecosystem with a large expanse of quartzite beach, as a back-up storage impoundment for the Gordon above Franklin Power scheme in the early 1970s.

The Environmental Services and Water Resources Departments in the Hydro-electric Corporation are responsible for guiding its related environmental responsibilities and water resources management. The environmental policy of the Hydro-electric Corporation has seven concerns; they are listed as sustainable development, responsible environmental management, compliance with environmental legislation, energy efficiency, open and effective communications, environmental expertise, and reviews of environmental performance (Hydro-electric Corporation, 1997: 6).

The key strategic objectives of the Hydro-electric Corporation's environmental management system are:

- clear definition of environmental responsibilities throughout the organisation;

- development and implementation of appropriate environmental training programs for staff and contractors;
- identification and risk assessment of potential environmental impacts resulting from the corporation's activities;
- development and implementation of strategic and operational environmental plans;
- consideration of environmental impact in the design and construction of new works;
- completion of comprehensive Environmental Impact Assessments for major new projects;
- development and implementation of environmental emergency plans;
- establishment of reporting and management protocols for environmental incidents;
- regular environmental auditing and inspection of assets and operations;
- environmentally sound management of oil and other chemicals;
- development and implementation of energy management plans;
- minimisation of impact on flora and fauna as a result of the corporation's activities;

- high standard land and vegetation management practices on land controlled by the corporation and along powerline wayleaves;

- remediation and rehabilitation of land contaminated or scarred by past construction practices and other activities of the corporation;

- maintenance of appropriate noise and air quality standards in areas adjacent to corporation assets and activities;

- mitigation of environmental impact resulting from activities in catchment areas surrounding lakes;

- management of impoundment to ensure maintenance of appropriate environmental values;

- mitigation, as practicable, of downstream environmental impact resulting from the operation of Hydro-electric power stations;

- support for open and effective communication on environmental issues with members of the community; and

- regular reporting on environmental performance (Hydro-electric Corporation, 1997: 7).

5.1.3 Local government

Turning to local government, we find that administrative structures and the scope of activities depend on the location and size of the local council, but despite the differences, each local council has a similar pattern of operation. Hobart is the capital city of Tasmania and the largest centre of population in the island. This paper will use Hobart City Council as an example of environmental management regimes at local government level in Tasmania, though such regimes are usually much more rudimentary in smaller councils. There are many local government sub-agencies involved in environmental management across all of Tasmanian local government. In the case of Hobart City Council they are the Parks and Customer Services Division, and the Development and Environmental Services Division.

According to the *Hobart City Council 1999~2000 Annual Report*, Parks and Customer Services is a diversified division that is concerned with the provision and co-ordination of parks and customer related services, facilities and issues. The Parks and Landscape Unit is most directly related to environmental management. This unit is responsible for such matters as bushland management, trees, Landcare and Friends of Reserves Groups, nature strips and weed eradication (Hobart City Council, 2000: 7; 1997: 5).

The Development and Environmental Services Division has seven units. They are:

- strategic development;
- development planning;
- development appraisal;
- environmental planning;
- heritage and conservation;
- urban design; and
- public and environmental health.

This division is responsible for:

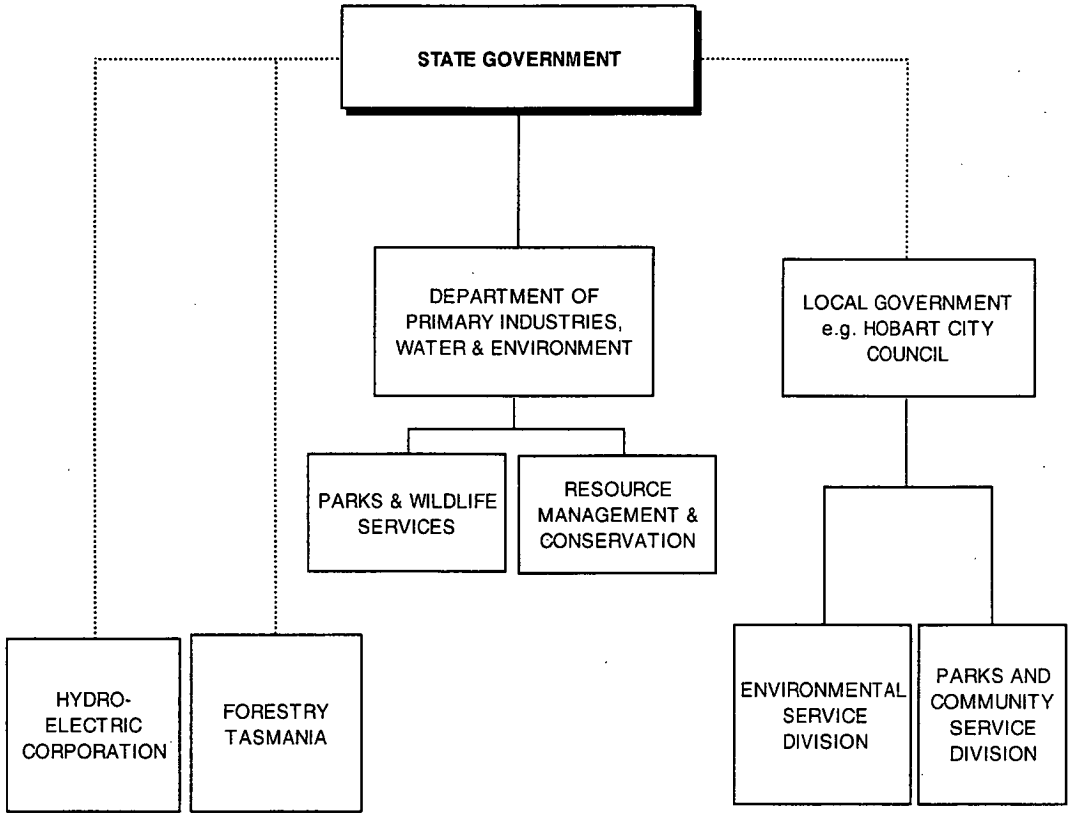
- strategic and local area planning;
- economic and environmental planning for sustainable development;
- statutory land use planning, planning scheme preparation and amendments;
- mapping and modelling for land use planning and economic development;

- urban design guidelines and criteria;
- cultural heritage assessment and development guidelines;
- identifying and promoting strategic development opportunities;
- planning and managing council's property portfolio;
- processing planning applications under council planning schemes;
- processing applications and administering building and plumbing regulations for development; and
- approving and supervising subdivisions, roads and other engineering works to be taken over by council (Hobart City Council, 1997: 8-14).

5.1.4 Summary

The organisation of environmental management related agencies in Tasmania is summarised in Figure 6 below.

Figure 6. Organisation of environmental management related agencies in Tasmania



- The dotted lines represent no direct control
- Forestry Tasmania and Hydro-electric Corporation are not governmental line agencies and are not responsible to Ministers.
- Different levels of government do not have a hierarchy of environmental responsibility but have their own areas of responsibility.

5.2 Terrestrial environmental management-related government departments in Taiwan

Compared to the Tasmanian structure, the distribution of responsibilities and administration related to environment management in Taiwan is scattered and complex. After the Communist Party took over mainland China in 1949, the Government of the Republic of China retreated to the island of Taiwan. When the United Nations claimed in 1976 that the Peoples' Republic of China was the only Chinese government, the Government of the Republic of China resigned from the United Nations. After more and more countries severed diplomatic relations with the Republic of China and switched recognition to the Peoples' Republic of China, most countries began to refer to the Republic of China as Taiwan.

The Government of the Republic of China settled the central government in the temporary capital city, Taipei. Under the central government are the Taiwan provincial government (currently being phased out) and Taipei and Kaohsiung special municipal governments. These two municipal governments, covering substantial populations, were accorded a status below that of the central level. The next level down is county and equivalent city governments, and the lowest level is region and district governments. In 2000, then, the political structure is a four level system changing to three levels. The following section will identify the

environmental management related government agencies in the Republic of China. This section also describes the different responsibilities for environmental management of government departments at different levels in Taiwan.

5.2.1 Central government level

There are five central government agencies directly involved with environmental management: the Environmental Protection Administration, Ministry of Economic Affairs, Ministry of Interior, Ministry of Education and Council of Agriculture.

Each individual agency has its own responsibilities, but there are also interconnected tasks that are poorly differentiated. For instance, in nature conservation in Taiwan, the Council of Agriculture manages Nature Reserves whilst the Ministry of Interior manages National Parks, and other reserved areas are managed by local government. The management of native flora and fauna is not a coordinated process. It is a similar situation with the management of river systems, in which responsibilities for the water resource and the environment surrounding the river, and the flora and fauna living in and by the river, belong to

different agencies. Furthermore, different agencies and levels of government manage the upper, middle and downstream sections of the river.

There is thus a tendency for the responsibility for any issue to be avoided by all the agencies involved and the result is inefficiency and worsening problems. For this reason some members of the parliament have called for the amalgamation of some agencies or the creation of a new agency to cater for integrated management.

Following is an outline of the different central government agencies responsible for environmental management.

5.2.1.1 Council of Agriculture

Agriculture has a strong impact on environmental management. When the Republic of China took over the government of Taiwan from Japan after the Second World War, economic activities were largely agricultural; the major

national income was from the sale of agricultural products to the domestic and overseas markets.

According to the Council for Agriculture (1996: 2-7), agricultural production was 32.3 percent of raw gross national product and the export value of agriculture products was 95.5 percent of total exports from Taiwan in 1952. However, since the 1960s, due to the mass importation of crops and raw processing materials, the balance of trade in agricultural products turned from favourable to unfavourable. The turning point was 1968. 1952 to 1968 was a highly progressive period, the priority being to promote land productivity as much as possible. From 1968 progress slowed markedly as the economy diversified. In 1994 agricultural products fell to only 3.6 percent of total gross national product.

As the structure of agricultural industry changed, the agency originally responsible, the Agriculture Development Council, became increasingly ineffective, and was replaced by a new agency, the Council of Agriculture, in September 1984. In addition to administering the national farming, forestry, fisheries, grazing and food industries, the Council of Agriculture also supervises other agencies involved with agriculture in provincial and municipal governments.

The Council of Agriculture is directed by the committee head with the assistance of a deputy committee head and secretary-general. There are six departments for agriculture management, five internal administrative offices, and two committees for legal business. The six departments managing agriculture are Planning, Grain and Food, Forestry, Animal Husbandry, Fisheries, Consultation and Assistance. The five internal administrative offices are the Secretariat, Personnel, Anti-corruption, Accounting, and Statistics. The two committees for legal matters are Laws and Regulations, and Appeal Deliberations.

The Planning Department is responsible for economic research, agricultural development plans, trade policy and information provision. The Departments of Grain and Food, Forestry, Animal Husbandry and Fisheries are responsible for related professional works and related engineering projects, prevention and remediation of pollution, and ecological conservation (Council of Agriculture, 1996: 2-7).

According to the *Construction Statistics Taiwan Area Year Report 1994*, the 'Green Lands'[10] of the Regional Plan[11] managed by the Council of Agriculture are natural reserves, wildlife sanctuaries, national forestry natural protection areas, hill and slope areas, and forestry recreation areas (Construction and Planning Administration, 1996: 60).

5.2.1.2 Construction and Planning Administration

The National Parks system in Taiwan is under the Construction and Planning Administration, Ministry of Interior. There is a National Parks Planning Committee directly under the Minister of Interior and above the Construction and Planning Administration.

The Department of National Parks has three sections. Their responsibilities are as follows:

[10] 'Green Land' is a term used in Taiwan for a reserved area and recreational space which is covered by vegetation.

[11] The Regional Plan is a management plan that crosses the boundaries between local governments.

- The first section is responsible for supervision and direction, assessment of interpretation, education, and conservation research in all National Parks and the execution, direction and supervision of coast plans;

- The second section is responsible for supervision, direction, examination, and assessment of facilities and construction projects in all National Parks, and the metropolitan park projects; and

- The third section is responsible for control and planning of land use, and the supervision and direction of recreation management in all National Parks, and the site selection, acquisition, planning and management of metropolitan parks.

Each National Park has a National Park Management Office, under which are the Divisions of Planning, Construction, Tourism, Conservation, Interpretation, and Field Management Station (Centre). The Planning Division is responsible for: the planning, modification, and review of National Park projects; the management, examination, supervision and direction of National Parks affairs; the control of National Park land; and the interpretation of regulations inside the National Park.

The Construction Division is responsible for the design, contracting, inspection, and supervision of recreation facilities, public amenities, and interpretation

installations inside the National Park. The Tourism Division is responsible for the management of visitors, the planning and servicing of recreation, management of tourism, rubbish control and removal, and site cleaning inside the National Park. The Conservation Division is responsible for investigation of and research into ecological resources, the natural environment, historic relics, and management of conservation inside the National Park. The Interpretation Division is responsible for the planning of interpretation services, the training of interpreters, information about interpretation, interpretation services for visitors, and raising public awareness of natural and cultural resource conservation inside the National Park. The Management Station is responsible for management and interpretation services inside the recreation area.

There is also a National Parks Police Corps for each National Park under the National Police Administration. It is responsible for public security, law and order, resource protection and enforcement of the National Park Act (Construction and Planning Administration, 1996: 184).

Apart from National Parks, the reserves of water resources, coastal protection areas, and metropolitan (regional) parks are managed by the Construction and Planning Administration, Ministry of Interior (Construction and Planning Administration, 1996: 60).

5.2.1.3 Environmental Protection Administration

The Environmental Protection Administration is the only central government agency solely responsible for environmental management. It contains thirteen branches. They are:

- the Bureau of Environmental Monitoring and Data Processing;
- the Bureau of Comprehensive Planning;
- the Bureau of Air Quality Protection and Noise Control;
- the Bureau of Water Quality Protection;
- the Bureau of Solid Waste Control;
- the Bureau of Environmental Sanitation and Toxic Chemicals Control;
- the Bureau of Performance Evaluation and Dispute Settlement;
- the Bureau of Incinerator Engineering;
- the Legal Affairs Committee;
- the Petition Deliberation Committee;
- the National Institute of Environmental Analysis;
- the National Institute of Environmental Training; and
- the Corps of Inspectors (Government Information Office, 1995: 230).

The Environmental Protection Administration is responsible for the measurement of pollution, the preparation of environmental protection bills, and the training of technical staff for implementing Taiwan's environmental protection regulations. Under the Environmental Impact Assessment program and other related Acts administered by the Environmental Protection Administration, any proposed development project within the natural environment in National Parks, on hill slopes, in scenic areas and in wildlife sanctuaries should be assessed and approved before its commencement (Government Information Office, 1995: 231).

5.2.1.4 Ministry of Economic Affairs

There are two agencies with environmental protection responsibilities within this Ministry. These are the Industrial Development Bureau and the Energy Commission. In addition, the Environmental Protection Divisions of State Enterprises, such as the Taiwan Power Company, are also under the Ministry of Economic Affairs and are responsible for related environmental management (Government Information Office, 1995: 230).

The decision-making agency with responsibility for water resources at the central government level is the Water Resources Bureau, under the Ministry of Economic Affairs. The responsibilities of the Water Resources Bureau are:

- drafting water use policies and legislation;
- planning, managing, establishing, supervising and coordinating the water use business;
- supervising the management of waterways, channelisation and protection of adjoining properties;
- supervising and coordinating the management of reservoir catchment, safety and dredging;
- distributing overall water resources, and registering, managing and supervising water usage rights;
- registering and supervising water use technicians, and directing and supervising the water use organisations;
- investigating water resources and examining water use;
- researching, developing, and coordinating water use technology;
- setting up a water resources information system, and processing and servicing information; and

- managing other related water use administration and promoting new water use business (Water Resources Bureau, 1996: 117).

5.2.1.5 Ministry of Education

The Environmental Protection Division under the Ministry of Education is a coordinating agency for environmental education. The division is in its preliminary stage and has an Environmental Education Committee, but a staff of only one assistant researcher.

The Environmental Protection Division has the followed responsibilities:

- formulation, coordination, tracking, supervision and evaluation of Environmental Protection Plans of educational institutes at primary, secondary and higher education level;

- promotion of environmental protection education in educational institutes at different levels and categories;

- coordination and evaluation of the contribution of agencies with an involvement in the implementation of Environmental Protection Plans of the Ministry of Education; and

- coordination of projects from other environmental protection agencies at the central government level (Ministry of Education, 1991: 1-10).

The Environmental Education Committee is responsible for:

- formulating environmental education policy and drafting environmental education related regulations;
- integrated planning of national environmental education;
- coordinating and evaluating the inter-governmental agencies' environmental education plans;
- developing and implementing environmental education at the level of the school/institute, society and family;
- developing and implementing professional sanitation and vocational environmental education;
- coordinating global environmental educational initiatives; and
- other business related to environmental education

(Ministry of Education, 1991: 1-10).

In 2000, the Environmental Protection Division is working with the Department of Compulsory Education, Department of Secondary Education, Department of Vocational Education and the Department of Higher Education under the Ministry of Education to set up the following projects:

- to establish an environmental protection group in every educational institute;
- to develop environmental education courses and teaching materials;
- to train teachers and educational administration personnel for environmental education;
- to improve outdoor education research;
- to enhance the environmental protection facilities of every educational institute;
- to train environmental protection specialists;
- to train agriculture, forestry, fishery, animal husbandry and medical professionals in environmental education; and
- to promote industrial safety education.

The Environmental Protection Division under the Ministry of Education works with the Department of Education under the provincial government and the

Taipei and Kaohsiung special municipal governments, the Education Bureau of local governments and individual institutes to establish the following projects:

- to promote environmental care activities;
- to promote environmental education research; and
- to review environmental education at each institute

(Environmental Education Committee, 1993: 1-11).

5.2.2 Provincial and Special Municipal Government

5.2.2.1 Taiwan Provincial Government

There were six agencies directly related to environmental management at the provincial level - the Department of Agriculture and Forestry, the Water and Soil Conservation Bureau, the Water Conservancy Bureau, the Department of Environmental Protection, the Mines and Minerals Bureau, and the Sea Fishery Bureau (Government Information Office, 1995: 230) - but all have now transferred their responsibilities to county and city governments in the wake of restructuring in 1998.

- the Department of Agriculture and Forestry was responsible for the management of farmlands, flora and fauna;
- the Water and Soil Conservation Bureau and the Forestry Administration were responsible for forestry management;
- the Water Conservancy Bureau was responsible for water management;
- the Department of Environmental Protection was responsible for the prevention and treatment of water and air pollution, the treatment of solid and toxic wastes, and the investigation and evaluation of environmental impact assessment for environmental development;
- the Mines and Minerals Bureau was responsible for mine and mineral management; and
- the Sea Fishery Bureau was responsible for marine resources (Common Wealth Magazine, 1996: 178).

5.2.2.2 Taipei and Kaohsiung Special Municipal Governments

Directly related to environmental management in the Taipei special municipal government is the Department of Environmental Protection. Its equivalent in the

Kaohsiung special municipal government is the Bureau of Environmental Protection.

The organisation of the Department of Environmental Protection under the Taipei special municipal government is divided into:

- section 1 : air pollution control, noise and vibration control;
- section 2 : water pollution control, vectors and toxic substances control;
- section 3 : collection and disposal of solid waste, cleaning and maintenance of environment;
- section 4 : garbage disposal, sanitary landfill, incineration plant planning and construction;
- section 5 : nightsoil disposal, management of public lavatories;
- section 6 : supervision, evaluation, and on-job training of vehicle accident handling;
- laboratory : analysis, monitoring, survey and research, and development concerning pollution control;
- general affairs office : documentation, purchasing, property management;

- accounting office : annual revenue and expenditure, accounting and preparing statistics;
- personnel office : personnel management; and
- anti-corruption office : anti-corruption (Taipei Municipal Government, 1994: 6).

Section 6 and the four offices do not have the direct role in environmental management that characterizes the other sections and the laboratory.

The wildlife management agency in the Taipei special municipal government is the Bureau of Reconstruction; and in the Kaohsiung special municipal government it is the Bureau of Business Management (Government Information Office, 1995: 777-778).

5.2.3 County and City Government

The agencies directly involved in environmental management at this level are the Environmental Protection Bureau, the Agriculture Bureau and the Reconstruction Bureau in each county or city government.

- the Environmental Protection Bureau is responsible for the prevention and treatment of water and air pollution, the treatment of solid and toxic wastes, and investigation and evaluation of environmental impact assessment for environmental development;

- the Agriculture Bureau is responsible for the management of forestry, marine resources, flora and fauna, farm land and water resources. Management areas are of varying types, depending on the location of the county or city government; and

- the Reconstruction Bureau is responsible for mine and mineral management (Common Wealth Magazine, 1996: 178).

5.2.4 District Government

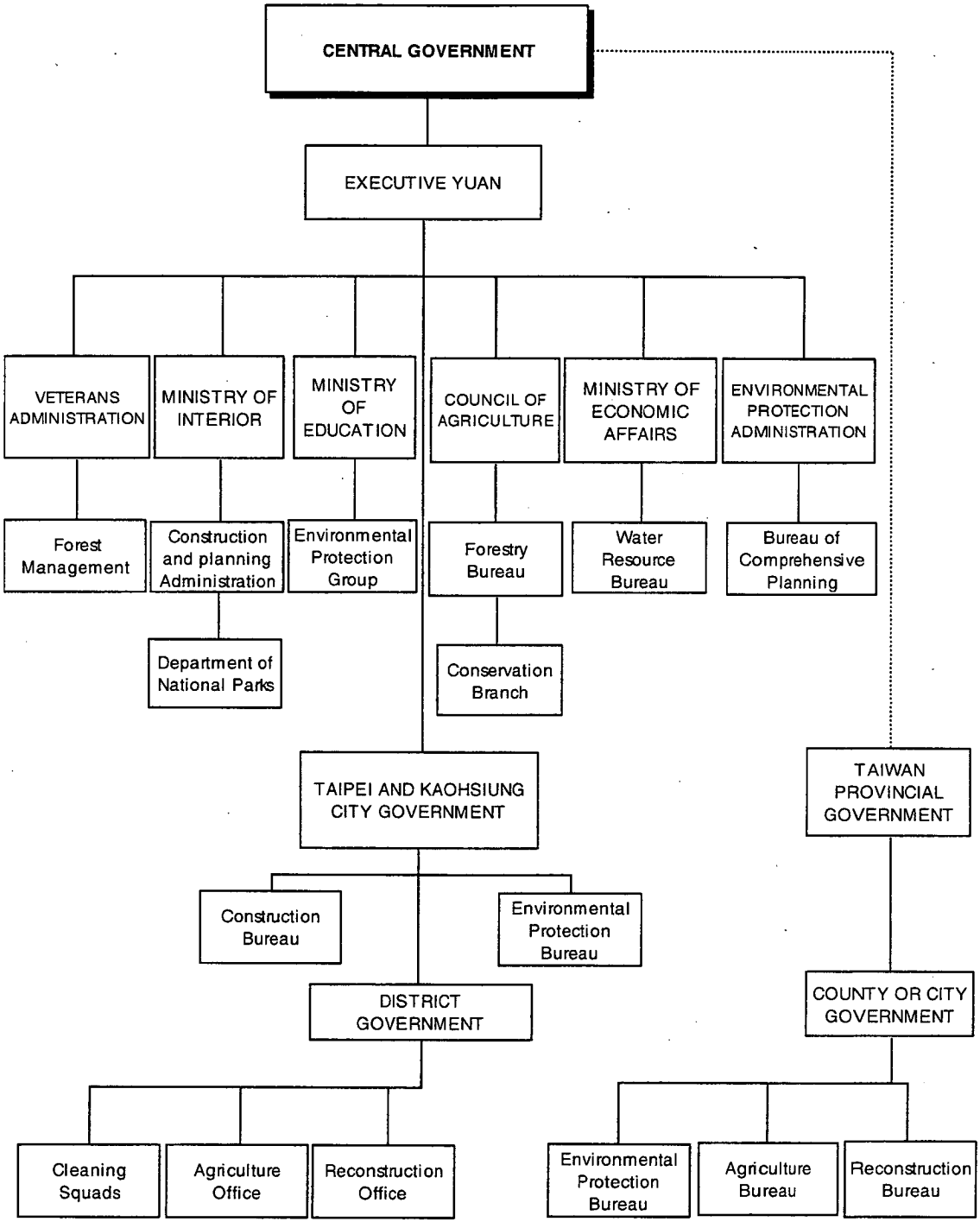
The district governments are the units of implementation of policies for environmental management at the baseline level. The environmental management related agencies at district government level are the Cleaning Squad, the Agriculture Office and the Reconstruction Office.

The Cleaning Squads are responsible for pollution control and management. Each Agriculture Office is responsible for the management of its district's agricultural activity. The Reconstruction Office is responsible for the management of water, mines and mineral resources (Common Wealth Magazine, 1996: 178).

5.2.5 Summary

Organisation of environmental management related agencies in Taiwan is summarised in Figure 7 below.

Figure 7. Organisation of environmental management related agencies in Taiwan



- The dotted line indicates that the Taiwan provincial government is being restructured, with its responsibilities going to the Central and local governments.

5.3 Comparison of government structure and functions between Taiwan and Tasmania

The major responsibilities of the Council of Agriculture (COA) in Taiwan, planning and management of agricultural and fishery resources, are similar to those of the Department of Primary Industry, Water and Environment (DPIWE) in Tasmania. As well as oversight of primary industry, the two agencies also have responsibility for soil and water conservation. The range of responsibilities for environmental management within COA is wider than DPIWE. COA also has responsibility for forest management, which resides with Forestry Tasmania (FT) in Tasmania. Furthermore, COA is also responsible for the planning and management of natural reserves and wildlife protection, which is the responsibility of DPIWE in Tasmania. COA thus covers the range of DPIWE and FT in environmental management responsibility.

That there is an independent agency for forestry in Tasmania, whereas forest management is under COA in Taiwan, shows the importance of the forest industry to Tasmania and indicates the priority that the Tasmanian state government places upon the planning and management of native and plantation forestry. The forest industry was once a major source of economic income in Taiwan. However, due to unsustainable management and changes in industry structure the emphasis has shifted from heavily harvested timber and its by-products to promoting forest recreation and tourism.

Responsibility for the planning and management of National Parks and natural reserves is separated in Taiwan. COA is responsible for natural reserves and wildlife protection while the Construction and Planning Administration (CPA) is responsible for National Parks and land management. Thus the planning and management of natural resources as a whole, including fauna, flora and habitat, is not integrated. In contrast, Tasmania's DPIWE provides more systematic and integrated planning and management of wildlife and natural reserves, though Forestry Tasmania has its own system of reserves, as do some local governments.

The Environmental Protection Administration (EPA) in Taiwan shares important responsibilities, notably environmental impact assessment and pollution management and planning, with DPIWE. EPA does not have responsibility for planning and management of the land (which is CPA's responsibility), but does have to deal with pollution. Compared to this, the management process of DPIWE seems more streamlined, making planning and management of land and pollution control more effective.

Concerning water resources management, DPIWE has a similar role to the Water Resources Bureau (WRB) in Taiwan, but has commenced integrated catchment

planning and management and this integration makes for a more effective water rights system.

The Hydro-electric Corporation (HEC) in Tasmania is the only mains power provider in the state, the island relying almost entirely on hydro power for electricity generation; while in Taiwan electricity is mostly generated by fuel burning or nuclear power stations and only partly by hydro power. In comparison to its counterpart in Taiwan, which is the Taiwan Power Corporation, the HEC has clearer and more highly developed environmental management and planning responsibilities.

The Ministry of Education (MOE) in Taiwan coordinates environmental education on a national scale. Although it still has a long way to go, this concept of integrating various government agencies for environmental education could be adopted and implemented in Tasmania.

Table 6 summarises the comparison of government structure and functions between Taiwan and Tasmania.

Table 6. Comparison of Government Structure and Functions between Taiwan and Tasmania

	TAIWAN	TASMANIA
Level of Government	Three (3) levels: Central County/Special Municipal City/District	Two (2) levels: State Local
AREA OF RESPONSIBILITY	**GOVERNMENTAL AGENCIES**	
Natural Reserves	Council of Agriculture	Department of Primary Industries, Water and Environment
Agriculture and Fishery	Council of Agriculture	Department of Primary Industries, Water and Environment
Soil & Water Conservation	Council of Agriculture	Department of Primary Industries, Water and Environment
Forestry	Council of Agriculture	Forestry Tasmania
National Parks and Land Management	Construction and Planning Administration	Department of Primary Industries, Water and Environment
Wildlife Conservation	Council of Agriculture	Department of Primary Industries, Water and Environment
Environmental Impact Assessment, Pollution Management and Planning	Environmental Protection Administration	Department of Primary Industries, Water and Environment
Water Resources	Ministry of Economy Affairs (Water Resources Bureau)	Department of Primary Industries, Water and Environment
Environmental Education	Ministry of Education	None

- The function of the Council of Agriculture covers part of the function of the Department of Primary Industries, Water and Environment and Forestry Tasmania
- Department of Primary Industries, Water and Environment covers part of the function of the Council of Agriculture, Environmental Protection Administration, Construction and Planning Administration and Ministry of Economy Affairs (Water Resources Bureau)

There are three broad research themes in organisational theory and management, according to O'Faircheallaigh, Wanna and Weller (1999: 44, 45):

1. the way in which organisations should be constituted and should function internally;

2. the question of how large, complex organisations can be directed in pursuit of goals set by relevant decision-makers; and

3. the way in which organisations relate to one another.

One of the key issues relating to the first theme concerns the number of 'layers' in the organisational hierarchy. It will be apparent that there is a large difference in governmental structure between Taiwan and Tasmania. At present, environmental management still involves four levels of government in Taiwan, whilst there are only three levels in Tasmania, and the weight of responsibility for environmental management effectively devolves upon just two of these levels.

Because Taiwan has been administered as an independent country for more than forty years, there is a central government level. Furthermore, Taiwan is a province of the Republic of China, hence there is also a provincial government, equivalent to the state government in Tasmania, to manage the environment and

natural resources, though this is changing, since the governmental reforms of 1998 will entirely eliminate the provincial government. As for the local government level, Taiwan, with its vastly greater population, has divided this into two levels, County/City and District, whilst there is only one level in Tasmania.

Taiwan's additional tiers of governmental structure suggest more bureaucratic procedures and less efficiency, qualities said to inhere within traditional public administration. As demonstrated in chapter three, the traditional public administration model is very much focused on procedure-setting, rather than on results (Hughes, 1998: 22). Traditional public administrative is considered to be conducive to timeserving and not innovation. It is said to encourage administrators to be risk-averse rather than risk-taking and to waste scarce resources instead of using them efficiently. Traditional public administration has also been criticised for producing inertia, lack of enterprise, red tape, mediocrity and inefficiency. In addition, the traditional bureaucratic model does not provide a structure of incentives and rewards equivalent to that in the New Public Management. Competition, consumer sovereignty and choice provide incentives to lower costs that are argued to be absent in the bureaucratic model of administration. Moreover, environmental management responsibilities in Taiwan are divided between so many different agencies that it is impossible to manage natural resource in an integrated way. This very complex organisational structure

needs a managerial approach to ensure that institutional goals actually drive the formation of priorities and the conduct of activities at three levels of the organisation (O'Faircheallaigh, Wanna and Weller, 1999: 44). On the other hand, the transformation of Tasmanian government agencies under the influence of New Public Management precepts might provide a promising framework for governmental restructure in Taiwan. Under the managerial model, corporate planning techniques can specify departmental responsibilities and increase accountability. Program budgeting can target scarce funds more effectively, and performance indicators provide a measure of how well targets are being achieved. Changes in the nature of employment away from the culture of the lifelong sinecure increase flexibility so that the most able are rewarded and the inadequate can be removed (Hughes, 1998: 78).

Chapter 6

ENVIRONMENTAL PROBLEMS AND MANAGEMENT REVIEW IN TASMANIA AND TAIWAN

Taiwan and Tasmania differ in their physical environments, political systems and cultures. Both islands have environmental problems. Some are similar, while others are peculiar to the particular island. It is therefore to be expected that issues, policies and management approaches would also vary. The first part of this chapter will discuss some environmental problems and management responses in each jurisdiction, followed by a comparison of their environmental management regimes.

6.1 The need for systemic environmental information: Tasmania's State of the Environment Report

Tasmania promotes itself as a clean, green and natural island. This is true in comparison to other islands, such as Taiwan, that are more heavily populated and polluted. Yet some Tasmanians have concerns about environmental conditions that seem to contradict the clean and natural image. The author has identified the issues that will be discussed in this chapter through analysis of the literature, and seven years of personal observation.

In recent years, the community has taken increasing account of the environment as a key factor influencing land development, especially in agriculture, industry, urban development, and mining and recreation activities.

In a survey conducted by the Australian Bureau of Statistics, Tasmanian Office, on May 1992, 76.8 percent of interviewed Tasmanians considered environment protection and economic growth to be equally important, and 13.4 percent of interviewees believed that environment protection was more important than economic growth. Only 6.5 percent thought that economic growth was more important than environmental protection (Commonwealth of Australia, 1994: 19; Tasmanian Year Book 1994). Thus, Tasmanians take a strong stand on environmental issues. Community attitudes such as these induced the government to prepare and present a publicly available report on environmental indices, the *State of the Environmental Report.*

The United Nations Statistics Office (UNSO) published the *Framework for the Development of Environment Statistics* in 1984. This framework had a strong impact on the way the mass media reported environmental news, and the way information was structured in environmental reports. It helped to provide a structural framework for the collection of environmental statistics. The framework provides four approaches that are listed below.

1. The first of these, the media approach, organises data on air, water, land and/or soil and the human environment to depict the state of the natural environment at particular times rather than focusing on continuous assessment of environmental change. This approach tends not to emphasise 'human-natural environment' interactions.

2. The stress-response approach involves an understanding of the processes of environmental change. It focuses on the stresses placed on the environment as a result of human activity and the reactions of the environment to these as depicted in a series of indicators. Within this approach, statistics are organised under the following categories: stressors, stresses, collective and individual responses, and stocks.

3. The resource accounting approach traces the flow of natural resources from their extraction (harvest) from the environment, through successive stages of processing and final use, to their return to the environment as waste or to the economic sector for recycling.

4. The ecological approach looks at a variety of relationships between plants and animals and their environment. Within this, it deals with such aspects as ecological diversity, system dynamics, biomass production, and the productivity of ecosystems (Tasmanian YearBook, 1996: 16).

The Tasmanian government used the stress-response approach to prepare its first *State of the Environmental Report* in 1997. The *State of the Environmental Report* consists of two volumes. Volume 1: *Conditions and Trends* is published and compiled by the State of the Environment Unit, Land Information services, Department of Environment and Land Management (Sustainable Development Advisory Council, 1997a). Volume 2: *Findings and Recommendations* was prepared by the Sustainable Development Advisory Council (Sustainable Development Advisory Council, 1997b).

To understand the function of the *State of the Environmental Report* and its role within Tasmanian government, it is necessary to understand the context in which it was generated. It took place under the auspices of the Sustainable Development Advisory Council (SDAC), an independent statutory body responsible to the Premier, through the Department of Premier and Cabinet. Disbanded in 1998, it had three key functions:

- submitting reports to the Minister on draft State Policies, with recommendations on whether the Draft State Policy should become a Tasmanian Sustainable Development Policy;

- preparing State of the Environment Reports and making recommendations for future action to be taken in relation to the management of the environment; and

- undertaking integrated assessments of declared 'Projects of State Significance' and reporting to the Minister with recommendations on whether or not the project should proceed, and if so under what conditions.

The members of SDAC were selected from a range of community, industry, conservation and local and state government interests. The independent Chairman attended to SDAC business on a part time basis with the assistance of a full time Executive Director and a secretariat.

SDAC was established by the *State Policies and Projects Act 1993* (SPP Act), which was the central piece of legislation within a newly established integrated Resource Management and Planning System (RMPS) for Tasmania (Sustainable Development Advisory Council, 1997b: vi). The objectives of the RMPS were:

1. to promote the sustainable development of natural and physical resources and the maintenance of ecological process and genetic diversity;

2. to provide for the fair, orderly and sustainable use and development of air, land and water;

3. to encourage public involvement in resource management and planning;

4. to facilitate economic development in accordance with the objectives set out in paragraphs (1), (2) and (3); and

5. to promote the sharing of responsibility for resource management and planning between the different spheres of government, the community and industry in the state.

Administration of the SPP Act was transferred from the Department of Environment and Land Management to the Department of Premier and Cabinet in March 1996. At that time, the Act governed:

- the development and approval of State Policies;

- the development of Projects of State Significance;

- the preparation of the State of the Environment Report; and

- the constitution and activities of the Sustainable Development Advisory Council.

The SPP Act defines the objective of sustainable development as:

"managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and their health and safety while:

- sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations;

- safeguarding the life-supporting capacity of air, water, soil and ecosystems; and

- avoiding, remedying or mitigating any advance effects of activities on the environment".

The first volume of the *State of the Environmental Report* consists of two parts. Part 1 *Environmental Conditions and Trends* reports upon physical environments, including natural and cultural habitats and the flora and fauna that

dwell in them. The chapters are Atmosphere[12], Land[13], Inland Waters and Wetlands[14], Biodiversity[15], Human Settlements[16], Cultural Heritage[17], Coastal, Estuarine and Marine[18].

Volume 1 Part 2 *Economic Sectors and the Environment* explores the human activities interacting with the environment. The chapters are Mining, Forestry, Agriculture, Sea Fishing, Energy, Industry, Transport and Tourism. Apart from presenting the economic contributions and resources of each sector, it also describes the cross-sectoral issues and the interrelationship with the environment, concluding by raising issues of 'towards sustainability' (Sustainable Development Advisory Council, 1997a).

[12] This includes the structure of the atmosphere, climate and air quality.

[13] This includes geodiversity, soil, vegetation, weeds, pests and diseases, fire, landscape, wilderness and land use.

[14] This includes water quantity, water quality, aquatic ecosystems, water use by activity, water supply development, and management of water resources.

[15] This includes Tasmania's flora and fauna, their origins and special features, threatened species, introduced and displaced species, habitat change and the reserve system.

[16] This includes population and settlements, environmental conditions and trends and social and economic conditions.

[17] This includes defining Tasmania's cultural heritage, its condition, awareness of heritage, pressure and response.

[18] This includes management arrangements, pollution, estuarine water quality review, and use and the effects of climate change.

The government in Taiwan does not have a similar State of the Environment Report or reporting process. The lack of coordination between governmental agencies leads to a situation whereby the various agencies draft their achievement statements or carry out environment management policy separately, and there is no integrated and systematic environmental investigation and reporting.

The author considers that the basic tasks for successful environment management are: firstly, to identify the deficiencies in past management in order to avoid repeating the same mistakes; secondly, to enable the decision-maker to understand present environmental problems in order to tackle them; and thirdly, to provide the government with the requisite data for developing a long-term vision to prevent potential environmental problems and reach the goal of sustainable environmental management. In the rectification of each of these difficulties, a process and outcome similar to Tasmania's *State of the Environmental Report* would seem to be essential.

6.2 Conserving biodiversity

As many scholars agree (for example, Bradstock et al., 1995: v), the conservation of biodiversity will not be entirely achieved by reserving land in National Parks

or nature reserves. Biodiversity conservation must work across tenure boundaries, preferably in a systematic and coordinated process. The chances of conserving biodiversity are optimised when a partnership of responsibility is set up between a wide coalition of interests.

However, National Parks and nature reserves are the apposite means for conserving most biodiversity. A comprehensive, adequate and representative network of protected areas built on the existing reserve system is a goal of Australian governments as expressed through the National Parks Policy and the Biodiversity Strategy. Political will and substantial funding are essential for effective implementation of this goal (Purdie, 1995: 414).

In Australia, biodiversity conservation is one of three core objectives of the National Strategy for Ecologically Sustainable Development (NSESD) (Commonwealth of Australia, 1992), and the Council of Australian Governments endorsed this strategy in December 1992. Its objective states that biodiversity is affected by almost every activity carried out by humans and if biodiversity conservation is to be achieved, it must be integrated with the everyday activities of individuals, businesses, industries and governments. NSESD principles provide a theoretical basis for such integration, but need to be applied so as to

provide effective strategy at the local level (Burbidge & Wallace, 1995: 11). In Taiwan, there is no national policy regarding the conservation of biodiversity.

Public appreciation and understanding of the value of biodiversity and the inclination of the public to protect are critical elements in any strategy to conserve biodiversity. Two strategies could be used as means of affecting change in community attitudes. The first is to focus on those types of biodiversity familiar to the majority of the population (e.g. urban bushland, forest) to promote a broader understanding of biodiversity concepts. The second is to link the satisfaction of the material needs of the community to wider landscape types to promote a sense of shared need and responsibility for protecting the biodiversity in these areas (Purdie, 1995: 413).

Although biodiversity as a popular concept within public discourse is only about twenty years old, the factors influencing biodiversity itself are, in some cases, of extremely long duration. The time scales appropriate for the scientific planning of biodiversity conservation are thus much longer than the time scales of policymakers and managers. The timeframes which affect human attitudes and decision-making processes need to be considered, however, as they may constrain the long-term implementation of solutions. The short timeframes of

political and planning cycles often make it difficult to adopt and implement policies with conservation objectives spanning decades (Purdie, 1995: 410-411).

Of the different threats to biodiversity, habitat loss caused by land clearance and native species extinction or endangerment causing by introduced species, are two of the most direct. Introductions of alien species can be the result of either deliberate or unintentional acts on the part of people. However, activities that mitigate or prevent such introductions provide an excellent opportunity for practical activity on the part of the environmentally concerned citizen.

Tasmania is free from some introduced large predators that have caused massive native species extinction or endangerment in mainland Australia (such as the fox). Some large and small herbivores, such as the deer and rabbit, were introduced by European settlers as game animals. This introduction caused vegetation change additional to the enormous conversion of native vegetation to farms and residences for human beings. In recent years, the feral cat has become the most ferocious small native animal killer in urban, rural and even remote reserve areas. Recently imported marine animals and plants have become serious pests, most notably the Japanese sea star *Asterias amurensis*, as have algal blooms in semi-enclosed waterways as a result of increased nutrient loads from agricultural runoff.

In Taiwan, although the major threats to biodiversity come from high levels of development, pressure from an expanding population and from serious pollution, introduced species are also an important factor. Unlike Tasmania, Taiwan has a serious feral dog problem, but fortunately it has not spread to remote reserve areas. Furthermore, Taiwanese agriculture, horticulture and aquaculture are continuously introducing new species for commercial purposes, causing large-scale decline of native species. In addition, the fashion of domesticating new pets captured in the wild (for example, jelly-fish and sea horses) has created a market for illegal smuggling with a large but unquantified impact on both Taiwanese wildlife and biodiversity in other parts of the world.

One biodiversity issue of particular relevance to Taiwan concerns threats to wetlands and wetland species. This issue is considered below.

6.2.1 Relationship to international treaties, programs and agencies: the Ramsar reserve system

We have seen that, because of its international political status, Taiwan cannot be officially involved in international treaties, programs and agencies. Nevertheless, despite not being formally recognised in international forums, Taiwan still makes an effort to contribute to global conservation.

The Ramsar reserve system is an appropriate means for Taiwan to pursue official international cooperation and recognition. There is a potential reserve that could be nominated for the rare black-faced spoonbill *Platalea minor* (Threskiornithidae) in Tainan, southern Taiwan. As we will see later, there are a few Ramsar reserves located around Tasmania. Thus its management experience might be valuable for Taiwan.

This subsection will introduce the Ramsar Convention and then use one site in Southern Tasmania as an example. Finally, the first potential Ramsar reserve in Taiwan will be discussed.

6.2.2 The Ramsar convention

The Ramsar Convention on Wetlands of International Importance is a treaty signed in Ramsar, on 2 February 1971. Its aims are to halt the worldwide loss of wetlands and to conserve those that remain through wise use and management (http://www.environment.gov.au/bg/environm/wetlands/ramsar/ramindex.htm).

Australia is one of the Ramsar Convention contracting parties and, therefore, should promote wetland conservation by:

- nominating specific sites to the List of Wetland of International Importance which will then be continually monitored to ensure that they retain their special ecological characteristics;
- promoting the 'wise use' of all wetlands within Australia;
- promoting the training of wetland managers;
- consulting with other countries, particularly in the case of a shared wetland, water system or resources such as migratory water birds; and
- creating and managing wetland reserves.

The three levels of government in Australia are all involved to different degrees in wetland management, and the State/Territory and local governments are primarily responsible for decisions which can impact on wetlands. State and Territory governments have passage of the legislation and administrative arrangements relating to the Ramsar Convention, whilst much of the on-ground management necessarily devolves upon state and local government units.

6.2.3 Ramsar sites in Tasmania

There are ten Ramsar sites in Tasmania[19]. These sites were selected on the basis of ecological, botanical, zoological or hydrological criteria for the List of Wetlands of International Importance (http://www.biodiversity.environment.gov.au/environment/wetlands/ramaust.htm).

Pittwater-Orielton Lagoon is one of the ten Ramsar sites in Tasmania. This site was designated on 16 November 1982, and is located on the southeast coast of Tasmania, approximately 20 kilometres east of the city of Hobart, between the towns of Sorell and Cambridge. It is 2920 hectares in area and comprises an estuarine system with a large area of saltmarsh.

The area is an extensive and diverse wetland with abundant bird life close to the capital city of Tasmania, Hobart. Pittwater is an almost land-locked body of tidal salt water with a narrow entrance to the ocean. A causeway separates Orielton Lagoon from Pittwater, and this constricts tidal flow and has helped create a 1.25 metres deep lagoon. Orielton Lagoon often contains large populations of

[19] These sites are: Moulting Lagoon, Logan Lagoon Conservation Area, Sea Elephant Conservation Area, Pittwater-Orielton Lagoon, Apsley Marshes, East Coast Cape Barren Island Lagoons, Flood Plain Lower Ringarooma River, Jocks Lagoon, Northwest Corner of Lake Crescent, Little Waterhouse Lake.

waterfowl, and is considered to be a significant refuge in times of drought. The area is Crown Land under the jurisdiction of the Department of Primary Industries, Water and Environment.

Hunting or disturbing wildlife in any way in or over Orielton Lagoon is prohibited by wildlife regulations. The site is currently used for fishing and boating and the local council has proposed dredging or filling of areas to control odours. The surrounding areas are used for residence and agriculture (mainly livestock grazing), and runoff from agriculture and effluent from development are the major threats to the area. The traffic over the causeway kills some wildlife.

As the Pittwater-Orielton Lagoon is close to Hobart and located between two towns, it is potentially a good example of semi-urban reserve management for Taiwan, and its lessons invaluable for avoiding similar errors and improving upon its management plan in any future application in Taiwan (http://www.biodiversity.environment.gov.au/environm/wetlands/site6.htm).

6.2.4 A potential Ramsar site in Taiwan

Numbers of Black-faced Spoonbill *Platalea minor* come every autumn to pass the winter in the wetlands at the Tsengwen River estuary in southern Taiwan. This large migratory waterbird is mainly restricted to coastal areas of East Asia. Not much is known about the species, its range, breeding grounds or migration routes (http://debut.cis.nctu.edu.tw/~yklee/NetZoo/Spoonbill/whats_e.htm).

At present, the best estimate of the population is about 400 individuals, making it one of rarest birds in the world. The largest congregation of this species anywhere in the world was in January 1995 at the Tsengwen River Estuary, near Tainan in southern Taiwan, when 286 birds were counted.

There are three known major wintering sites for this species: Tsengwen River estuary, Taiwan; Deep Bay (including Maipo Marshes Nature Reserve) located between Hong Kong and China; and the Red River Estuary of Vietnam, with smaller numbers being recorded in small numbers in China, Japan, and other sites in Taiwan (http://com5.iis.sinica.edu.tw:8000/~cwbf/issue/ebfsb.html).

Being so rare, the Black-faced Spoonbill faces serious threats to its survival. The Wild Bird Society, Republic of China (WBSC), joined BirdLife International (an

international non-government agency) at BirdLife International's twenty-first meeting in August 1994 and invited international experts with their corresponding expertise in research and conservation to help develop an *Action Plan for the Conservation of the Black-faced Spoonbill.*

Following a call for support from various agencies, the Council of Agriculture answered with financial and technical assistance. A draft Action Plan was prepared over January 16-21, 1995. There was a public forum held to announce the contents of the draft Action Plan, which was then sent out for review to government agencies, conservation NGOs and academics.

The goal of the *Action Plan for the Conservation of the Black-faced Spoonbill* is to plan and coordinate conservation and research directions, and to try to generate support from governments, NGOs and other concerned individuals for the conservation of this species through relevant research leading ultimately to some concrete actions.

The document contains the latest information on the species' distribution and related biological and conservation status. Because there are obviously many missing pieces, a priority of the plan is to conduct basic research. Already a few

birds have transmitters that have enabled preliminary information from satellite tracing in early 1999.

All the habitats used by the Black-faced Spoonbill are facing threats. Important among these are loss and degradation of habitat, mostly resulting from development pressures and the pollution associated with high human population density. Expanding agricultural land and aquaculture ponds, and construction of industrial zones and housing development are the main causes of loss of habitat.

In addition, there are other serious threats, such as the effects of pollution and competition for declining food resources with other animals, and disturbance from human activities. People will have to work together if this species is not to become extinct in the near future. Because its habitats extend across national boundaries, there is no other way except cooperation between nations.

Species-specific action plans have broad applications for protecting wildlife on the brink of extinction. These species-specific action plans are widely used documents in Europe and America, but the *Action Plan for the Conservation of the Black-faced Spoonbill* is the first such document to be formed for an Asian species. The Action Plan is to be used as a reference for each country's own

conservation work but has no legal status. Thus, if the habitats could be nominated as Ramsar sites according to the Ramsar Convention, it would be a great assistance for ensuring the survival of this species, particularly as there is a major threat to the Chiku site, as described below (http://com5.iis.sinica.edu.tw:8000/~cwbf/issue/ebfsb.html).

The proposed Binnan Industrial Zone is planned close to the Chiku wetlands, the wintering home of the Black-faced Spoonbill. The planned industrial zone is a development plan at the heart of which is the Tuntex Company, which wants to invest in the development of a seventh naphtha cracker (Chiching) special industrial area, and the Yielung Company which wants to invest in the construction of a steel mill.

Investment in the Chiching refinery project will altogether reach New Taiwan Dollar (NT) NT$ 260,000,000,000 (about US$ 10,000,000,000), while the total investment in the Yielung steel mill will run to NT$ 128,300,000,000 (about US$ 4,800,000,000).

These two investment plans are situated in Tainan County, on the western side of the Chiku Township. The Taiwan Salt Works currently controls the 1330

hectares sought by the Tuntex Company, and the 1030 hectares required by the Yielung Company, and apart from the sixth naphtha cracker, this is the largest private investment plan in Taiwan.

Besides the strong opposition to the planned refinery and steel mill projects from local environmentalists and ecologists, there are international environmental concerns also adding pressure to the Taiwanese government, and even possible economic sanctions are suggested.

The proposed Binnan Industrial Zone will certainly impact upon the ecology of the Black-faced Spoonbill. All environmental impact assessments report that continuing with these developments will damage the habitat for the birds, yet the Tainan County government refuses to consider alternative plans. The predicament of the politicians and economists is that these two investment projects will be economically beneficial and provide employment opportunities, yet conservationists believe that the ecological and social costs are far greater than the benefits and that ecotourism is a preferable alternative development (http://com5.iis.sinica.edu.tw:8000/~cwbf/issue/ebfsb.html).

6.2.5 Summary

The *Action Plan for the Conservation of the Black-faced Spoonbill* provides a good blueprint for ensuring the survival of the Black-faced Spoonbill, yet without declaring the Chiku wetland a Ramsar site, the goal of the plan may be in vain. Becoming an internationally recognised conservation site not only gives better management guidelines, it also provides governments in Taiwan with great political incentive to action. Taiwan is trying extremely hard to secure official international recognition and demonstration of a willingness to act in scrupulous accord with international treaty regimes is an important means of getting such recognition.

The Pittwater-Orielton Lagoon Ramsar site near Hobart in Tasmania can serve as a template for similar sites in Taiwan where a nature conservation project is situated in a wetland close to large residential and industrial sites.

6.3 Water and soil conservation

The two most vital natural resources for human survival are water and soil. Thus, degradation of water and soil resources is a serious problem. There are different

causes of degradation, as well as different approaches to mitigation and prevention. These vary by culture and country.

Large-scale clearance continues at a rate of c 10,000 ha p.a. in Tasmania. Existing cleared agricultural land is subject to widespread accelerated erosion. Even uncleared land, such as the Central Plateau Protected Area, is subject to accelerated erosion. In Taiwan, inappropriate and illegal development for housing and agriculture on unstable hill slopes has led to severe landslides after typhoons, causing considerable damage to both human life and property. Taiwanese governments use law enforcement as the sole means of undertaking water and soil conservation. In Tasmania there are no legal constraints related to soil maintenance, and few related to water quality and quantity. However, there is a Landcare movement that has been moderately effective in raising public awareness of land and water degradation problems. This provides a potentially good model for Taiwan to use as a supplement to and partial substitute for water and soil conservation by legislation and legal enforcement.

The following two sections are largely taken from the Masters thesis of the author (Chen, C., 1994).

6.3.1 Landcare

Though there are many definitions of Landcare used by different organisations and interest groups, a widely accepted one is that coined by the Department of Primary Industry and Fisheries, Tasmania: "Landcare is about people working together to ensure that the use and management of the land resource is sustainable, both ecologically and socio-economically" (Department of Primary Industry and Fisheries, 1992: 1).

Roberts (1989: 13) points out that when the first European settlers arrived, they immediately reduced the ground cover by clearing, grazing and cultivation. Compared with the Aborigines, Europeans have made many mistakes in land use that have caused large-scale land degradation. But from the mid-1940s Australians have gradually become aware of serious environmental problems. Since 1945, South Australia has operated Soil Boards in several regions. Other states developed various forms of advisory groups in the 1960s in response to the more serious instances of land degradation. In Victoria, a group of farmers tackling local land degradation and management problems through an integrated approach, formed what was to be the beginning of 'Landcare', and community support for the popular farmer-led organisation has been building since the 1970s (Department of Primary Industry and Fisheries, 1992: 3).

In the late 1970s, the Federal Government adopted a National Conservation Strategy (NCS). This was followed by a Soil Conservation Strategy (SCS) in the mid-1980s and State Conservation Strategies (SCS). The Federal Government in 1983 established the National Soil Conservation Program (NSCP) and in 1985 the Soil Conservation Act allowed the Federal government to grant funds to each state government for land conservation (Roberts, 1991a: 2; 1991b: 1).

Victoria first registered 'Landcare' as a government program to assist voluntary community land conservation groups in 1986. In the same year, the rural communities of many other states began informally establishing groups to tackle their local land degradation problems. The term 'Landcare' came to be used to describe these groups and the land conservation activities they undertook (Commonwealth of Australia, 1993: 5).

In 1989, the Australian Soil Conservation Council with the endorsement of the Australia Conservation Foundation (ACF) and the National Farmers' Federation (NFF) initiated the Decade of Landcare. Later that year Prime Minister Hawke declare in his statement "Our Country, Our Future" that the 1990s would be the Decade of Landcare, beginning in 1990 with the Year of Landcare. He also outlined a plan costing more than $320 million for Landcare and associated conservation programs (Commonwealth of Australia, 1993: 5).

According to the Federal Government, the main objective of the Decade of Landcare was to achieve ecologically sustainable use of Australia's lands by the year 2000. The former Soil Conservation Advisory Committee (SCAC) recommended to the Commonwealth Minister in early 1990 that the Federal Government should develop a plan for the Decade of Landcare to coordinate action by the community and all levels of government, to combat land degradation across Australia (Commonwealth of Australia, 1993: 5-6).

In 1990, the Australian Soil Conservation Ministerial Council directed that all government agencies - Commonwealth, states, and territories - prepare plans for the Decade of Landcare. These plans were to be based on consultation with all persons responsible for land management including individual landholders, community groups, state, territory and Commonwealth agencies, local government and peak national bodies. Draft plans were submitted and late 1991 and early 1992 saw the release of plans for the Decade of Landcare (Commonwealth of Australia, 1993: 6).

A National Overview was also prepared in which National Goals were to:

- raise the awareness of the whole community about the problem of land degradation and the benefits of sustainable land use;

- continue the development and implementation of sustainable land use principles and practices;

- allow all Australians to work together in partnership for sustainable land use; and

- put into place effective and appropriate economic, legislative and policy mechanisms to facilitate the achievement of sustainable land use (Commonwealth of Australia, 1993: 6).

The combination of different government agencies' plans and the National Overview produced the National Decade of Landcare Plan. Integrated land, water, vegetation and other natural resources management were to be addressed concurrently with a major emphasis on total catchment management, a development from the original Decade of Landcare conception which focused on land degradation and land conservation (Commonwealth of Australia, 1993: 6).

In 1993 Prime Minister Keating indicated that there had been a dramatic increase in the number of Landcare groups, from 600 Landcare groups in 1990 to approximately 1600 in 1993. He recommended that the whole community make the sustainable use of natural resources a reality. The Federal Government has increased and diversified its support of Landcare programs in order to

complement its commitment to ecologically sustainable development (Commonwealth of Australia, 1993: foreword).

Since 1993 The National Landcare Program (NLP) has been the Commonwealth's main natural resource management program and is designed to encourage a 'whole systems' approach. This approach is evident in the variety of Commonwealth agencies now involved in Landcare. For example, the Landcare and Environment Action Program (LEAP) was established as a labour market program aimed at supporting Landcare related activities (Commonwealth of Australia, 1993: foreword).

In December 1992, Prime Minister Keating announced in his Statement on the Environment several initiatives to complement the Landcare effort, including:

- $2.9 million for a nationally coordinated program of water quality monitoring activities designed to raise community awareness of total catchment management;

- an additional $7.6 million to enhance the Save the Bush program and to support a Corridors of Green project along the Murray River;

- an additional $46 million over 4 years for improved water management in rural and urban catchments to tackle the key sources of nutrients, such as

sewage plants, that contribute to algal blooms in the Murray Darling Basin; and

- $15 million over four years for the control of feral animals and weeds, including $5 million for the control of *Mimosa pigra*, $2 million for a program to address the nature conservation threat posed by cane toads, and $8 million for programs to reduce the impact of feral animals and to encourage greater community involvement in their control (Commonwealth of Australia, 1993: foreword).

Landcare has great potential to be modified and adapted for Taiwan to promote water and soil conservation through a community orientation rather than solely by law enforcement.

6.4 Changing environmentally destructive behaviour: environmental education

Of all the means to improve nature resource management, environmental education is the most fundamental long-term solution. Through various educational channels, environmental friendly values could be disseminated to the general public with consequential change in social behaviour toward an ecologically sustainable society.

The Australian Association for Environmental Education (AAEE) defines environmental education as: "an across-the-curriculum approach to learning which helps individuals and groups to understand the environment with the ultimate aim of developing caring and committed attitudes that will foster the desire and ability to act responsibly in the environment. Environmental education is concerned not only with knowledge, but also with feelings, attitudes, skills and social action" (Fien, 1993a: 1, 12). Howe and Disinger also maintain that the basic purpose of environmental education is, in the view of most of its supporters and many of its practitioners, the development of responsible individual and societal environmental behaviour (Howe and Disinger, 1991: 5). Baines states that the ultimate purpose of environmental education is to give people a proper environmental ethic (Baines, 1986: 12).

Some writers (Calder and Wildy, 1990: 188; Dyer, 1994: 6; Greenall, 1988: 55; Radbone, 1990: 148; Spork, 1992: 147; Wals, 1992: 46) argue that environmental education should involve three aspects. The first is to impart knowledge about the environment; the second to teach 'real life' in the environment; and the third is to foster an ethic for the environment so that students can live an environmentally responsible lifestyle. Most educators (Baines, 1986: 10; Greenall, 1988: 55,57; Hunwick, 1990: 134; Tilbury, 1994: 17; Traynor, 1990: 174) emphasise the importance of educating for the environment, i.e. enhancing positive environmental ethics in students is much

more important than teaching knowledge about the environment or imparting knowledge 'in' the environment.

Chen, C. (1995) claims that it would be easier to adopt an ethic of harmonious behaviour with the environment if people could become convinced that humans are part of the environment rather than its managers or stewards. If they held this conviction, they would not so much hold the view that they have to 'help' the environment but would realise that human beings rely on, not 'use' the environment. Degrading practices could then be expected to stop. So the focus should shift from educating 'for the environment' to 'oneness with the environment' (Tilbury, 1994: 5,9; Hunwick, 1990: 134,136). This concept is commonly lacking in modern societies but has existed in indigenous cultures such as those of the Australian Aborigines (Tilbury, 1994: 17; Schmiechen, 1994: 13), and within Chinese culture in the form of Taoism (UNESCO, 1988: 3) for a long time. The Aboriginal land ethic and experience, for example, can be found in the South Australian educational package, *Kids for Landcare* (Golding, 1990: 159).

6.4.1 Environmental education in Australia, including Tasmania

Fien (1993b: 2) states that Australian environmental education can be traced back over the 40,000 years of Aboriginal history. He argues that the Aboriginal people developed systems for their knowledge of the land, its cycles, the need to respect it, and the management practices that would allow them to use the land as a resource in a sustainable way. This knowledge was passed down through the generations by means of stories, dance, ceremonies and the establishment of a network of sacred places. An Australian Aborigine, Nelson, says in the video *Through Aboriginal Eyes*:

> Land means more than just possession to Aboriginal people. In fact we never ever possess the land, in actual fact the land owned Aboriginal people. And it doesn't make any difference from what part of Australia where the Aboriginal peoples come from or where they live. The land that they live in is so important to them ... and the reason why it is so important because the land was given to them by the spiritual ancestors. They taught Aboriginal people how to survive and live on the land, how to ensure when that live in it, you will realise that Aboriginal people and the land are one (Nelson, 1983).

The Aboriginal system of environmental education continues today through family relationships and through special programs in Aboriginal community schools and even in some progressive non-Aboriginal schools. Mainstream school education, however, does not incorporate Aboriginal environmental perspectives. There is still a long way to go.

Greenall traces the 'contemporary' Australian history of environmental education to a time prior to the 1970s when environmental education existed in the form of nature and outdoor education. In her view environmental education had its first formal recognition in Australia in 1970 at the Australian Academy of Science Conference on Education and the Environmental Crisis held in Canberra (Greenall, 1988: 59).

Five years later, in 1975, a conference was held in Melbourne as part of the lead-up to the UNESCO Inter Governmental Conference on Environmental Education in Tbilisi in 1977. Fien considers these two conferences to have catalysed the modern environmental education movement that has developed in Australia since those conferences. The curriculum and professional development programs that followed led to an acceptance by the Departments of Education in all states of the definitions and prescriptions for environmental education developed by the UNESCO-UNEP International Environmental Education Program (Fien, 1993b: 4). The Curriculum Development Centre (CDC) played a very important role in supporting school based curriculum projects in addition to developing a limited range of curriculum materials in environmental education at the national level in Australia from 1973 to 1983 (Parry, 1987: 10).

Greenall (1988: 59) believes that the release of the World Conservation Strategy in 1980 provided a new focus, a new phase and a new challenge for environmental education to foster or reinforce attitudes and behaviour compatible with a new conservation ethic. She also concludes that the subsequent development and endorsement of the National Conservation Strategy for Australia (NCSA) provided a new direction and a 'new beginning' for environmental education in Australia (Greenall, 1988: 59).

Within the NCSA, Greenall (1988: 59) explains, education and training are identified as the first-priority national action for improving the capacity to manage the environment for sustainable development. Education is given the task of promoting an awareness of the interrelationships between the elements of the life support systems and of encouraging the practice of living resource conservation for sustainable development. The role of environmental education is thus the accomplishment of the objectives of the NCSA that have provided a new stimulus for environmental education in Australia (Greenall, 1988: 59).

In 1980, the Curriculum Development Centre circulated to all Australian schools information about the aims of environmental education:

- To help students acquire an awareness of and sensitivity to the total environment;
- To help students develop a basic understanding of the total environment and the interrelationships of man and the environment;
- To help students develop the skills necessary for investigating the total environment and for identifying and solving environmental problems;
- To help students acquire social values and strong feelings of concern for the environment;
- To help students acquire the motivation for actively participating in environmental improvement and protection;
- To help students identify alternative approaches and make informed decisions about the environment based on ecological, political, economic, social and aesthetic factors; and
- To provide students with opportunities to be actively involved at all levels in working towards the resolution of environmental problems (Greenall, 1980: 4).

In 1987 the Third National Environmental Education Seminar, *Environmental Education - Past, Present and Future*, was organised by the Department of Arts,

Heritage and Environment. The purpose was to review the status of environmental education in Australia as part of an Australian report to the UNESCO-UNEP *International Congress on Environmental Education and Training*, which was held in Moscow in August 1987 (Greenall, 1988: 55).

The Australian Education Council (AEC) met in Hobart in 1989, and agreed on national goals for schooling in Australia which have come to be known as the Hobart Declaration (Fien, 1993b: 5). In the same year, the Commonwealth, State and Territory Ministers for Education agreed on the Hobart Declaration of ten *Common and Agreed National Goals for Schooling in Australia.* Goal 6 includes "the need to develop in students an understanding of, and concern for, balanced development and the global environment" (Fien, 1993b: 8).

In 1992 all states endorsed the National Strategy for Ecologically Sustainable Development. Fien uses Queensland as an example of the key role that the Education Department has been assigned in its implementation. An objective of particular relevance in Queensland proposes the incorporation of the principles of ecologically sustainable development into curricula and assessment and teaching programs of schools and higher education (Fien, 1993b: 5).

Fien was invited to Taipei to hold a weekend teacher's workshop about his 'teaching ecologically sustainable development' kit on March 1999. Despite the

different school systems and language barrier, the workshop was successful and indicates the potential for adapting the Australian experience to Taiwan.

Tasmania has a pioneer *Landcare for Teachers Program* that has been modified and successfully exported to other states in Australia. Chen, C. (1995) recommends that this Tasmanian program could also be modified and implemented with success in Taiwan.

6.4.2 The broader context of environmental education in Australia, with special reference to Tasmania

Many different groups in Australian society are involved in environmental education (Commonwealth of Australia, 1987:1). Greenall (1988) lists primary and secondary schools, field study centres, TAFE institutions, tertiary education institutions including teacher education departments, newspapers (environmental issues reporting), magazines (environmental column comment), radio (environmental events broadcasting) and television (environmental programs and drama) as involved in environmental education.

To this we can add other sources of the environmental message (even advertisements in the media may emphasise the environmental friendliness of products), such as government agencies, voluntary conservation organisations, environment centres, community groups (guides and scouts, for example), professional organisations, industry groups, local councils, informal groups, and families who are or can be involved in environmental education. Environmental education thus happens within both formal and non-formal education in Australia (Commonwealth of Australia, 1987: 1; Greenall, 1988: 55).

The author in the course of research on a wider environmental education training program, attended a Ranger Naturalist training course for the 1994 Summer Program which was held by the Parks and Wildlife Service of Tasmania. The author investigated the public environmental education activities around different National Parks in Tasmania. The training course invited two representatives from the Tasmanian Aboriginal Land Council to provide Aboriginal views on the environment. This gave participants an insight into native knowledge and the value of connecting oneself with the environment.

The *Landcare for Teachers Program* and other teacher training programs could include a similar session in their training courses. In Tasmania, after the recommendation of Chen, C. (1995), the *Landcare for Teachers Program* was modified and a section added on Aboriginal values.

Environmental education helps to raise public awareness of environmental issues and ways of finding solutions to environmental problems through both formal and non-formal means (Greenall, 1988: 55). Of these, formal education is likely to be more effective and more structured, although both are important.

6.4.3 The formal education system in Australia, with special reference to Tasmania

Due to the diversity within the formal education system in Australia, and the strong tradition of school-based curriculum development in which schools and teachers are responsible for student learning, the position of environmental education in Australian schools varies from state to state, school to school, and from teacher to teacher, this making it difficult to provide an exhaustive picture of environmental education in Australia, including Tasmania (Fien, 1993b: 4; Greenall, 1988: 56).

According to Greenall, school curricula in Australia contain many areas that relate to environmental education in Australia. Originally, ecology was the subject most closely associated with environmental education. Geography and

social studies later became involved in environmental education. Currently language studies, music, media studies, history and social education may also have objectives relating to environmental education (Greenall, 1988: 57).

6.4.4 Outdoor education in Australia, with special reference to Tasmania

Eagles and Richardson (1992: 11) define outdoor education as the practice of teaching students in, as well as about, the natural environment. Furthermore, outdoor education provides first-hand experience of the environment and this is important in education on and for the environment (Baines, 1986: 10). Excursions and field trips are the most common and easy forms of outdoor education but the venue is not always 'nature' and may include 'artificial' or human influenced environments such as farms, parks, field study centres, and so on.

James (1987: 10) notes that outdoor education has been a growth activity over the past decade or so. Principals, teachers and parents are increasingly coming to appreciate the value of outdoor education in enhancing classroom learning and in providing the skills that are not possible to acquire in the classroom. James points out that the need for detailed planning, the importance of supervision over extended hours, and the concern for the safety of students are critical areas of

responsibility for the teachers. Thus, thorough organisation, strict adherence to guidelines, careful instruction of students and carefully considered decisions on matters such as the organisation of outdoor programs is important (James, 1987: 10). However, the lack of flexibility of school programs due to rigid timetabling and the shortage of funds are problems which still need to be addressed (UNESCO, 1983a: 5).

Although outdoor education makes added demands on teachers, it is worthwhile because the students and teachers both profit. This is not simply from the blend of theory with practice and the "realism" which enters the curriculum, but the student-teacher relationship frequently enjoys a new domain of understanding and trust, and often results in growth in confidence, resourcefulness and self esteem (James, 1987: 10-11). Excursions and field trips are thus very important in environmental education as well as valuable in self-development (Fensham, 1986: 235).

Tasmania has much to offer the outdoor education experience in Taiwan. Tasmanian volunteer groups and Non-Government Organisations operate field study centres that constitute a good model for the private sector in Taiwan. For example, a volunteer group manages a private wildlife sanctuary, Chauncy Vale, and provides workshops for teachers and school groups, and for the interested public. There are no private field study centres in Taiwan, yet with the

enthusiasm of conservation groups and individuals an effective field education centre, learning from the Tasmanian experience, could be established.

In addition, there are well-established government sponsored school vacation programs around National Parks and nature reserves in Tasmania, and these have accumulated much useful experience in government-funded outdoor environmental education programs. The 'summer programs' offered and run by the National Parks and Wildlife Service in Tasmania operates every summer in various sites in different National Parks and nature reserves. Short term 'ranger-naturalists' are employed during summer school holidays and they provided educational activities, including group and individual guided walks and talks, slide shows and campfire billy-tea and damper making, and dramas to entertain and educate visitors. Suitably adapted, these could also provide government in Taiwan with examples to follow, as these activities are 'soft' approaches that can help meet public demand for outdoor recreation in Taiwan.

6.4.5 Problems of environmental education in Australia, with special reference to Tasmania

Despite the fact that environmental education is beginning to permeate the curriculum in Australian schools, problems still remain. Hickey reports on a

'Conference for Earth Education' held by the Institute of Earth Education at Scots Creek Field Centre, South Australia, on 22-24 August, 1986. The Conference pointed out that one of the problems of environmental education programs was "lack of focused, sequential, instructional programs as a regular, integral part of the whole curriculum" (Hickey, 1987: 3).

Cooper and Smith (1989: 76) argue that the failure of environmental education today stems from the lack of urban-based environmental education programs. As nearly 80 percent of our population lives in urban areas and global society is becoming increasingly urban, the starting point should be urban environmental issue (Baines, 1986: 10; UNESCO, 1983b: 5). Urban growth and land use, transportation, air and water quality, noise and energy problems should be investigated (UNESCO, 1983b: i-ii).

Hickey (1987:3) argues that environmental education has largely failed because educators do not help learners understand the processes of the environment but focus instead on knowledge acquisition. Hickey also indicates that a successful environmental education program should offer a 'carefully crafted, focussed, sequential, cumulative series of learning experiences designed with specific outcomes in mind' (Hickey, 1987: 3). Although Tasmania faces similar problems to other parts of the world, including Taiwan, research and programming for teacher environmental education is comparatively advanced in Tasmania, and its

programs tend to meet the criteria listed above by Hickey. Tasmania's 'Landcare for Teachers Program' and 'Summer Program' can be considered exemplars, and are well suited for Taiwan to adapt in creating its own educational programs.

6.4.6 Profile of environmental education in Taiwan

Chen, P. (1993:1) identifies four major environmental education programs in Taiwan: recycling education, outdoor education, enrichment reading materials for pupils, and the infusion model (i.e. environmental education across the curriculum). Recycling education is the most popular form of 'environmental education'. The students are told to bring their household recyclable items to school and sort them there rather than recycle at home. At one stage, schools were so eager to win the recycling competition that teachers and students consumed more products than they needed for the sake of reaching recycling targets. This is not the purpose of recycling education but the very opposite. Fortunately parents and environmentalists pointed out the problem and the recycling rush has cooled down. The campaign must be judged a failure, largely because it failed to reach the broader community (Chen, P., 1993: 6-10).

Short school excursions are treated as outdoor education, normally a half-day or a day visit to zoos or parks but rarely to the natural environment. Furthermore,

the huge safety responsibility that goes with taking a large class out of school makes teachers reluctant to take the class beyond the classroom (Chen, P., 1993: 6-10). Enrichment reading materials are proposed to supplement textbooks but this adds a burden on students who are already heavily loaded. In addition, these materials mostly emphasise known facts and knowledge rather then assist the student to appreciate the natural environment (Chen, P., 1993:6-10). The infusion model is sometimes claimed to have potential for cross-curriculum development, but has not yet been put into practice. This lack of environmental education curriculum planning, and inadequate teacher training in environmental education, results in conflicting environmental education practices in Taiwan (Chen, P., 1993: 6-10).

Outside the formal educational system different government and Non-Government Organisations and religious groups hold seminars and correspondence programs in environmental education. For example, since 1990, the Baha'i Office of the Environment for Taiwan has launched joint projects with the Council of Agriculture to promote environmental education among kindergarten and primary school teachers around the country. Baha'i environmental education teams visit schools all over Taiwan, organising simulation games designed to teach basic environmental principles. The Baha'i community has also produced about 30 radio programs on environmental issues

and published a book on environmental education in collaboration with a Non-Governmental Organisation, the Home Makers Union (GIO, 1993: 493).

In Taiwan, Chen, P., (1993: 4) notes that only student teachers of natural science have some environmental education content in their course and there is no training for the student teacher of social science, art, music, physical education and languages. In addition, only contextless facts are taught. The training given natural science teachers can only be deemed inadequate. Most teachers, therefore, including natural science teachers, do not have confidence in teaching environmental studies (Chen, P., 1993: 4). Furthermore, teachers and administrators receive only a limited in-service training in environmental education through a variety of very short activities such as one-day seminars and normally on a one-off basis. This limited training is not compulsory and, again, focuses on facts rather than environmental values. Thus, the whole education system has a long way to go to reach the goal of effective environmental education in Taiwan (Chen, P., 1993: 4).

6.5 Summary

Despite the different physical environments, political systems and cultures, the islands of Taiwan and Tasmania face similar environmental problems, including

biodiversity loss and the need for improvements in environmental education. Although not all the experience can be transferred, within these common issues the Tasmanian model provides potentially valuable lessons to Taiwan. For example, the State of the Environment Report should be introduced to Taiwan to allow government and public a better understanding of the whole environmental picture in order to avoid further degradation and improve management practice.

The government and people of Taiwan are committed to global conservation and very much wish to join the international community by gaining membership of international organisations and becoming party to international treaties, including Ramsar. Once the application of the first Ramsar site in Taiwan has become reality, Tasmanian experiences of managing Ramsar sites can also be made available.

The Landcare concept and its implementation in Tasmania can be adapted and promoted in Taiwan to enhance water and soil conservation. Tasmania's 'Landcare for Teachers Program' and the National Parks and Wildlife Service' 'summer program' provide guidelines for similar programs in Taiwan. The success of private field study centres in Tasmania also demonstrates that the private sector can play an important role in outdoor education.

Chapter 7

TERRESTRIAL RESERVE SYSTEMS

7.1 Introduction

Management of landscapes that will provide for the long-term wellbeing of both nature and humanity requires the cooperative efforts of all who live in and manage that landscape. It also requires that decisions be based on scientific knowledge about the health and dynamics of landscapes, including that of all of the existing systems, both natural and human-made (Wright, 1996: 28). Nature conservation is a subject of worldwide interest and activity. The goals of nature conservation include biodiversity and geodiversity maintenance and the maintenance of ecological processes. One widely used means of achieving the goals of nature conservation is the establishment of protected areas in which nature conservation has primacy over other uses. These carry various titles (e.g. National Park, nature reserve) in different parts of the world. They will be called nature reserves in the rest of this chapter.

Shafer (1990: xi, 8) claims that nature reserves are the best overall tool for preserving examples of natural landscapes and their biotic communities for future generations. Much of the world's terrestrial biota will soon be confined to nature reserves. Many of these reserves are likely to be separated from each other by landscapes much more disturbed than the reserves themselves. The context of individual nature reserves, in relation to one another and to man-modified landscapes and their people, needs careful consideration. Nature reserve management is increasingly challenged by activities outside the site boundaries, and the challenge is likely to escalate as time goes on. Thus, setting aside protected areas does not mean the attainment of preservation and the end of the conservation task (Shafter, 1990: 10; Wright, 1996: vii), for they must be managed in the context of their surrounding ecological and cultural landscapes. However, discussion of issues outside natural reserve systems is beyond the scope of this chapter.

This chapter will discuss the values underpinning the formation of Western nature reserves and examine design and management issues. This provides a general background and useful information for the planning and ongoing management of nature reserves.

7.2 Formation of western nature reserve systems

In 1967, at the request of the United Nations (UN), the International Union for the Conservation of Nature (IUCN) published the first UN list of National Parks and equivalent reserves. To be included on the list, National Parks had to meet three criteria concerning protection status, minimum size and effective enforcement (IUCN, 1975). A National Park was defined as a relatively large area:

1. where one or several ecosystems are not materially altered by human exploitation and occupation, and where plant and animal species, geomorphological sites and habitats constitute a special landscape of great beauty;

2. where the highest competent authority of the country has taken steps to prevent or eliminate as soon as possible exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphological or aesthetic features which have led to its establishment; and

3. where visitors are allowed to enter, under special conditions, for inspirational, educational, cultural and recreational purposes (Machlis & Tichnell, 1985: 9, 10).

7.3 Nature reserves classification

McNeely and Miller (1984: 47-53) recommend diverse management approaches for protected areas that seek to accommodate the economic and social requirements of society while still protecting natural resources. The management of reserves is a dynamic process, changed and modified by policy and law, the natural and social-economic attributes of reserves, and implementation effectiveness. If reserves are classified by these attributes and then managed in different ways according to their classification, the management of reserves will be more effective and conflicts between various interest groups will be reduced (Fang, 1997: II).

The categories of protected areas listed by the International Union for the Conservation of Nature and Natural Resources are:

1. scientific reserve/strict nature reserve: These areas possess some outstanding ecosystems, features, and/or species of flora and fauna of national scientific importance; they often contain fragile ecosystems or areas of particular importance to the conservation of genetic resources;

2. National Park: Relatively large areas that contain representative samples of major natural regions, features, or scenery, with plant and animal species,

geomorphological sites, and habitats of special scientific, educational, and recreational interest;

3. natural monument/natural landmark: One or more specific natural features of outstanding national significance, which, because of uniqueness or rarity, should be protected; these features are not of the size or diversity that would justify their designation as a National Park;

4. nature conservation reserve/managed nature reserve/wildlife sanctuary: These are specific sites or habitats whose protection is essential to the continued wellbeing of resident fauna or migratory fauna of national or global significance;

5. protected landscape or seascape: Natural or scenic areas found along coastlines and lake and river shores, sometimes adjacent to visitor-use areas or population centres, with potential to be developed for a variety of recreational uses;

6. resource reserve/interim conservation unit: These areas normally comprise an extensive and relatively isolated and uninhabited area having difficult access, or include regions that are lightly populated yet may be under considerable pressure for colonisation or resource development;

7. natural biotic area/anthropological reserve: Natural areas where the influence or technology of modern humans has not significantly interfered with or been absorbed by the traditional ways of life of the inhabitants;

8. multiple-use management area/managed resource area: Areas designed to provide for sustained production of or access to water, timber, fauna, pasture, marine products, and outdoor recreation;

9. biosphere reserve: Areas containing unique communities with unusual natural features, examples of harmonious landscapes resulting from traditional patterns of land use, and examples of modified or degraded ecosystems that are capable of being restored; and

10. World Heritage site: Areas that are of true international significance (Wright and Mattson, 1996: 1-3).

Wright and Mattson (1996: 4-5) state that most natural reserves, or National Parks and protected areas, fit into the first four of these management categories. These areas possess some or all of the following characteristics:

- outstanding ecosystems, features, and/or species of flora and fauna of national scientific importance;

- fragile ecosystems or life forms, areas of important biological or geological diversity, or areas of particular importance to the conservation of genetic resources; and

- representative samples of major natural regions, features, or scenery, where plant and animal species, geomorphological sites, and habitats are of special scientific, educational, and recreational interest.

7.4 Design theories and models for nature reserves

UNESCO (1974) outlined a concept of a biosphere reserve with a ring pattern. The core is the least disturbed zone, where development is not permitted and uses are strictly controlled. This area is for strict protection, research and education.

The buffer zones are intended not only to shield the core area from the direct impact of human activity, but for other purposes; for example, to provide space for wide-ranging species, such as large herbivores with seasonal migrations. They also exist for rare species for which the core may be too small to permit an adequate population size, to set aside an area for manipulative research that could be compared to nonmanipulative research in the core, and to segregate some recreation or tourism activities to avoid adverse effects on the more protected inner core.

The founders of the biosphere reserve concept exhorted reserve planners to be aware of important environmental, social, and economic issues in the surrounding area. Adequate address of these issues could protect the core area from progressive isolation and human exploitation. Reserve planning and zoning should also be based on the carrying capacities of the different zones (Shafer, 1990: 76).

7.4.1 Nature reserve design variables: shape

The optional reserve shape is much debated. A round reserve has been widely declared superior to any other shape (Diamond and May, 1976) on the basis of a biogeographic generalization called the "peninsula effect"; that is, the number of species often diminishes as one proceeds to the end of a peninsula (Simpson, 1964).

Local extinction at the end of a peninsula is assumed to be counteracted by individuals migrating from more central regions, though probably at a slow rate. However, such predictions are unlikely to be applicable in all situations. Reserve shape may be unimportant, depending on the species-area relationship and its

influence on species numbers, so long as reserves are not very thin, in which case edge effects become overwhelming (Shafer, 1990: 93).

7.4.2 Nature reserve design variables: size

Shafer (1990: 69-72) argues that the application of general rules for natural reserve system design is risky. Management of individual situations usually demands autecological data. Autecological studies of individual species and their relationship to other species in the ecosystem should be given a high priority. Such information can also supplement the application of some general models. The question of reserve size can be best answered on a species by species basis. Large carnivore ranges might be used as indicators to estimate reserve areas for species assemblages (Shafer, 1990: 69-72).

Another factor to consider in determining reserve size is minimum viable population levels. Main and Yadow (1971) estimated that some species of kangaroos and wallabies in Australia have a minimum viable population size of 200 – 300 individuals. They conclude that reserves larger than 202 km^2 are needed to maintain representatives of all the regional fauna in Australia over long

periods and must include the diversity of topography and soils found in the region. Nevertheless, it should be emphasised that no such determination has yet been made with confidence for any species, taking into account various demographic, environmental, and genetic catastrophes (Shafer, 1990: 141, 142).

Genetics should be another consideration when designing nature reserves (Frankel, 1970). For example, on a genetic basis, Tyndale-Biscoe and Calaby (1975) recommended a minimum reserve size of 60 km^2 for a common Australian mammal, the greater glider. Initial attempts to estimate minimum viable populations (MVP) and minimum areas required (MAR) for unsubdivided populations of mammals provide a range of population sizes of 100s or 1,000,000s and areas up to millions of km^2 for high level to mid- to long-term security (i.e., 95 percent probability of persistence for 100 or 1000 years, respectively).

Population growth rates, their variability, and population density set the ranges. These estimates of MVP and MAR compare unfavourably with the size class distribution of current reserves but may be reduced by further theoretical, empirical, and experimental development or by comprehensive planning and management providing multiple reserves for most species (Shafer, 1990: 74).

7.5 Diversity and different needs for management of nature reserves

Machlis & Tichnell (1985: 1, 2) state that National Parks are a particular and uniquely human use of nature. Scattered across the globe, located in diverse climates, continents, and countries, they are managed by different governments and visited by peoples of many cultures. National Parks around the world are faced with increasing demands: to house more wildlife; to entertain more visitors; to absorb more pollutants; and to offer up more resources for agriculture, forestry, and mining. These demands are causing increased impacts on nature, impacts relating to the day-to-day implementation of National Park policies. The voices of field managers and park superintendents, wardens, rangers, conservation officers are often not widely heard.

Wright and Mattson (1996: 3) estimated that there were more than 2700 National Parks and protected areas in over 120 different countries. This number increases yearly. There areas are as diverse as the physical setting and cultural patterns of the nations that have established them, yet they all have one thing in common – they serve as special places where people go for spiritual, cultural, and physical renewal. However, National Parks and reserves are becoming isolated from surrounding natural habitat by encroaching civilisation. Habitat loss or fragmentation is the leading cause of species extinction today.

Habitat losses can render some species extinct, particularly if rare or with patchy distributions, and increase the likelihood of extinction of remaining species because of reduced population sizes. Insularisation can decrease or eliminate colonisation of reserves from outside areas, and remove resources outside reserve boundaries upon which species in the reserve depend for survival. To resolve fragmentation problems, nature reserve planners and managers need to know more about the scientific foundation and adequacy of the guidelines under which they operate (Shafer, 1990: 5).

7.6 Guidelines for ecological monitoring and research for nature reserves

One of the best weapons for addressing increasingly complex management problems is reliable scientific information. This requires good research and a tight linkage between research and management. Scientists are often criticised for not being sufficiently informed about management needs and potential applications of scientific data. On the other hand, managers are often criticised for not having adequate scientific training to make informed decisions about natural resource activities. Unless the importance of science-based management and protection of natural resources is recognised and required by all employers,

significant changes in actual job performance cannot realistically be expected (Wright, 1996: 419, 428).

In addition, research is required to establish the objective need for resource developments and to assess their physical and socio-economic implications. Without it, society may continue to choose those resource-use options that have easily definable, short-term political or economic advantages but which fail to take account of their longer-term environmental and economic consequences. Furthermore, research must be based on a sound understanding of the legal, administrative, economic and political contexts within which resource management decisions are made. Then recommendations might be more readily and effectively incorporated into decision-making processes (Munton and Rees, 1981: foreword). When carefully planned and implemented research produces sufficient scientific information, these data can provide a concrete base for setting up clear standards and measures of performance in the New Public Management framework for natural resource management.

Ecologically sound management of protected areas requires constant surveillance and monitoring of existing conditions in order to identify changes and trends (Wright, 1996: xvi). An ecological monitoring program for any natural area should include the following steps:

1. Scoping, i.e., determining what to monitor and what questions the monitoring program will answer; at this stage, it also is a good idea to determine some of the questions that monitoring will not answer.

2. Determining how and when to monitor through research.

3. Establishing data management procedures.

4. Establishing reporting procedures.

5. Documenting the monitoring protocols; these protocols should be permanently established in written documents (Wright, 1996: 27-28).

7.7 Critiques of western nature reserves

MacEwen and MacEwen (1982: 3) argue that National Parks can be seen as part of humankind's reaction to its own ruthless exploitation of nature. The nineteenth century saw the conquest and division of the globe by the advanced industrial nations of the West, and the use of industrial technology to exploit the natural resources of the world.

The cornucopian view that the bounty of nature has no limits was common in Western societies, and nowhere was it held more strongly than in the United States of America where the very scale and character of the process of conquest produced its own, specifically American, reaction. A study of the origins of National Parks in the US suggests that they arose from the search for a national identity and the glorification of the scenic wonders revealed by the exploration and conquest of the West (Runte, 1979).

National Park purposes are many and varied, and in many countries, including Taiwan, these purposes are not fully understood by those who conceive the idea or draft the legislation (MacEwen and MacEwen, 1982: 1, 3, 5, 6). Davis (1980: 8) argues that Australian politicians and public had considerable confusion about the nature and purpose of National Parks. The author would argue that the situation is even worse in Taiwan.

MacEwen and MacEwen (1982: 282) criticise the present National Parks system in Britain as essentially cosmetic. There are severe limits to what can be achieved by superficial measures if the underlying causes of degradation are neither diagnosed nor dealt with. MacEwen and MacEwen believe that tactical adjustments to this National Park system are necessary and that the broader

purposes of National Parks are dependent on radical changes in the direction of government policies and economic trends.

There is potential within the National Park system for the emergence of a far more positive approach to land management. MacEwen and MacEwen (1982: 282) suggest that a potential area of improvement is in establishing lines of communication between conservationists and decision-makers, so that the latter will become aware of conservation deficiencies. This is more readily achieved under the New Public Management framework whereby managers are selected according to desired outcomes.

In addition, great improvements in communications, in education, in fieldwork and research are all indispensable. Natural resource management issues are ideological, economic and ultimately political, and will be resolved only when politicians are well enough informed and subjected to sufficient pressure to make conservation a politically and economically attractive course (MacEwen and MacEwen, 1982: 283).

Wright (1996: vii) also argues that the management processes in National Parks require not only the efforts of multidisciplinary professional teams but a better

ecological understanding by the public and political leaders. Without the latter, the efforts of the former are likely to be in vain.

7.8 Nature reserves management: A multiple task

The role of nature reserves needs to be viewed in the context of evolving physical, social, and legal environments (Wright, 1996: xv). Eidsvik (1985: xi) states that although National Parks are a reflection of natural processes, they are also the creations of a political process. Without stable societies there can be no stable parks; and when natural processes are given adequate consideration in park establishment and management, it is likely that a park can remain ecologically stable.

Although National Parks are as diverse as the physical settings and cultural patterns of different societies, they face common problems. Understanding of potential threats should enable managers to take corrective action before destructive disturbances of habitat occur. National Parks reflect, and help create, people's pride and love for their national heritage.

Human activities have a potentially great impact on the values of National Parks. Parks in Taiwan receive more visitors than those in Tasmania because of the larger population. Due, again, to the larger population size, resources and expertise are available to develop more tourism infrastructure. These in turn increase the likelihood of human impacts in parks.

In 1984, the IUCN prepared a list of the world's most threatened protected areas to increase public awareness and support for conservation activities. The report found that inadequate management resources and human encroachment were the most common threats to National Parks (Machlis & Tichnell, 1985: xi, 22, 26). This finding also accords with the two most serious problems in the nature reserve system in Taiwan.

7.9 Applications to Taiwan and Tasmania

Both Taiwan and Tasmania have established National Parks and nature reserves of various other designations (chapter two). As mentioned in the earlier chapters, vast differences of population and social, cultural and political backgrounds between Taiwan and Tasmania imply that planning and management of nature

reserves are likely to be very different. Despite these differences, the theory of conservation reserve systems discussed in this chapter applies to both islands.

Tasmania has the advantage of a small population and low pressure on land use for residential and industrial developments. Thus it can afford careful advanced planning, based on thorough research of ecosystems and consideration for the socio-economic situation of communities near nature reserves. It is no surprise that Tasmania has more reserves, both in number and area, than Taiwan (chapter 2).

During the study period, new National Parks and other nature reserves have been planned and declared and there is the potential for further protected areas to be established in Tasmania. The theory presented in this chapter can guide nature reserve planning and decision-making in Tasmania in the future, and there is evidence (obtained in informal discussions with National Parks and Wildlife Service personnel) that such theory already informs much thinking in reserve establishment and management.

In contrast, Taiwan has the disadvantage of very high demand for housing and increased economic activity due to its large population. Therefore, it is more

difficult to follow the guidelines for planning discussed above, though there is still scope for adapting the theory in ongoing management. Furthermore, having fewer nature reserves both in quantity and quality in Taiwan, there is a need to improve the efficiency of the management regime and to learn skills from more experienced counterparts such as Tasmania. The Tasmanian agency reform, based on the New Public Management framework, as an example to follow has been discussed in section 3.4 of this study.

In addition, a proposal for a new National Park in Taiwan was put forward during the research period (see section 4.4). The Tasmanian experience could be adopted and guidelines from this chapter should be considered for planning and management of the new National Park if it is established.

7. 10 Summary

The key concept that distinguishes areas in natural reserves from other parts of the landscape is that they are places where natural species assemblages and natural processes dominate. Even those inimical to modern society are allowed to

exist and direct human interference with ecological processes is prohibited or restricted in scope (Wright & Mattson, 1996: 4-5).

The creation and continued existence of nature reserves is usually the result of conflict over land use from different interest groups. There are guidelines for managing and planning nature reserves and the ultimate goal should be for wise land use and a sustainable state of human impact upon the environment.

Once this is achieved, there will be no further need for setting aside and managing nature reserves, because the short-term strategy will have accomplished its aim. Thus, the author argues that reserve systems are transitional means to conserving natural resources until such time as there is no longer a need to limit human behaviour, when human beings live harmoniously with their surrounding environments.

Chapter 8

KEY PERSONS INTERVIEWS - RESULTS AND DISCUSSION

8.1 Introduction

Natural resource management is a relationship between human beings and the environment. This management affects how humans relate to and fit into their environment. Although human beings are part of nature, we have a greater desire and power than other species to change the environment around us and we have the ability to consider and regulate our behaviour towards the environment. It is extremely important to understand the opinions and experiences of managers of natural resources in order to examine and improve practice.

This chapter presents information derived from interviews with natural resource managers in both Tasmania and Taiwan. The interviews address questions developed in earlier chapters. These complement the comparison of the two different governmental structures in Taiwan and Tasmania presented in Chapter two. They relate to past, present and future problems of natural resource

management discussed in Chapter three. Furthermore, the interviews demonstrate the concrete issues of nature management theory considered in Chapter four. The aim of this chapter is to seek a practical basis for adjustments to natural resource management practices on both islands.

8.2 Methods

Interviews in Taiwan were either at a National Park within the Department of National Parks under the Construction and Planning Administration or the Conservation Branch of the Forestry Bureau under the Council of Agriculture. In Tasmania, all interviews were conducted in the Department of Environment and Land Management (which became part of the Department of Primary Industries, Water and Environment after the interviews had been conducted).

The interviewees were selected for a representation of views of field managers and policy makers from different sections of governmental agencies. In Taiwan, interviewees' positions consisted of a National Park Superintendent and a Division Chief in a National Park; an Interpretation Officer and Wildlife Coordinator in the Conservation Branch of the Forestry Bureau under the

Council of Agriculture; and the Section Chief of the Department of National Parks under the Construction and Planning Administration. In Tasmania, they constituted a Planning Officer, a District Manager, a Branch Manager, an Education Officer and the Manager, Conservation Initiatives in the Department of Environment and Land Management (now the Department of Primary Industries, Water and Environment). Thus, five key people were interviewed on each island.

8.2.1 Interview structure

A structured face to face interview technique was used with clear, simply written questions delivered in advance of the interview and open ended answers were collected in interaction between interviewee and researcher (Wadsworth, 1984: 31). The questions were similar for the respondents in Tasmania and Taiwan, although delivered in different languages. All interviews were recorded with the permission of interviewees by means of audio tape recordings and transcribed notes (see appendix b). Comparisons were made and common threads drawn out.

The questions for interviewees in Tasmania were as follows:

1. Australians are beginning to realise the alarming extent of the threat to biodiversity caused by factors such as the introduction of foreign species, development of agriculture and forestry and urban expansion. For example, the Japanese sea star is causing great damage to the local Tasmanian estuarine ecosystems. What sort of experience do you have with such problems and how do you suggest that they should be managed?

2. Australia has a Landcare movement, which aims to foster water and soil conservation. Taiwan is a rugged island with variable rainfall. Can you provide your experiences and suggestions regarding water and soil conservation and the Landcare movement?

3. In Australia, conservation agencies are generally in charge of issues related to biological conservation. In Taiwan such issues are divided among different governmental departments. In your opinion, what are the advantages and disadvantages of each and what is the better model?

4. A number of environmental regulations have been promulgated and strictly implemented in Australia. Do you think there is still room for greater

enforcement of environmental laws in Tasmania? If so, please point out the areas that should be more strongly enforced by law.

5. Australia has signed environmentally related international treaties and is involved in many international projects and organisations. Taiwan has worked hard on environmental protection and is eager to join international environmental organisations. Could you describe the present status of, and future plans for, international cooperation in Tasmania?

6. Australian environmental problems are becoming more serious in urban areas. Taiwan, with its high-density population and limited space, has already faced pollution problems. Please say how you think the problems of air, water and noise pollution and waste management should be solved.

7. Australia promotes nationwide environmental education through various levels. In recent years, Taiwan has begun to realise the importance of environmental education. Please give your ideas on the short, mid and long-term objectives of environmental education in Tasmania.

8. The Australian Government provides funding for Non-Government Organisations (NGOs) working in areas of environmental conservation. In return, input from the NGOs has reduced the policy load of government in the development of environmental protection policy. Does your agency have a similar approach? What is your opinion of the roles of NGOs and governmental agencies?

9. Taiwan hopes to exchange ideas on, and experiences of, natural resource management. Do you think that there is any area in which both Taiwan and Tasmania will benefit from an exchange of information?

The questions for interviewees in Taiwan were as follows:

1. Australians are beginning to realise the alarming extent of the threat to biodiversity caused by factors such as the introduction of foreign species, development of agriculture and forestry and urban expansion. For example, Japanese sea star is causing great damage to the local Tasmanian estuarine ecosystems. Is Taiwan facing similar problems? What sort of experience do you have with such problems and how could you suggest that they should be managed?

2. Australia has a Landcare movement, which aims to foster water and soil conservation. Can you provide your experiences and suggestions regarding water and soil conservation and the Landcare movement?

3. In Australia, conservation agencies are generally in charge of issues related to biological conservation. In Taiwan such issues are divided among different governmental departments. In your opinion, what are the advantages and disadvantages of each and what is the better model?

4. A number of environmental regulations have been promulgated and strictly implemented in Australia. Do you think there is still room for greater enforcement of environmental laws in Taiwan? If so, please point out the areas that should be more strongly enforced by law.

5. Australia has signed environmentally related international treaties and is involved in many international projects and organisations. Taiwan has worked hard on environmental protection and is eager to join international environmental organisations. Could you describe the present status of, and future plans for, international cooperation in Taiwan?

6. Australian environmental problems are becoming more serious in urban areas. Taiwan, with its high-density population and limited space, has already faced pollution problems. Please say how you think the problems of air, water and noise pollution and waste management should be solved.

7. Australia promotes nationwide environmental education through various levels. In recent years, Taiwan has begun to realise the importance of environmental education. Please give your ideas on the short, mid and long-term objectives of environmental education in Taiwan.

8. The Australian Government provides funding for Non-Government Organisations (NGOs) working in areas of environmental conservation. In return, input from the NGOs has reduced the policy load of government in the development of environmental protection policy. Does your agency have a similar approach? What is your opinion of the roles of NGOs and governmental agencies?

9. Tasmania hopes to exchange ideas on, and experiences of, natural resource management. Do you think that there is any area in which both Taiwan and Tasmania will benefit from an exchange of information?

8.3 Results and discussion

The following findings are presented in order of the questions asked.

8.3.1 Question 1

In response to this question, interviewees in both Taiwan and Tasmania agreed that it is a very important and complicated problem for natural resource management. For example, in Tasmania, Bosworth (1997, personal communication, appendix b) stated that the introduction of non-native species is a major problem for Tasmanian environmental management. In Taiwan, Chen (1998, personal communication, appendix b) indicated that introduced species are an ongoing problem for Taiwan. When introduced species were seriously damaging agriculture, the government in Taiwan drew up a special pest control budget to tackle the problem, but there are no specific policies to deal with non-agriculture-related problems.

Both islands have unique and sensitive ecosystems that are the habitats for various endemic species, e.g. the Tasmanian Devil *Sarcophilus harrilus* is found wild only in Tasmania (Tasmanian Conservation Trust Inc, 1987; 24). Mooney (1997, personal communication, appendix b) stated that Tasmania is not only

different from the rest of the world but also has species that the Australian mainland does not, and that endemic species conservation is made difficult because of the frequent traffic between Tasmania and other states in Australia.

Compared to Taiwan, Tasmania has extensive areas of natural environment and has a high level of both local and state endemism. Tasmania thus carries more responsibility for global biodiversity conservation. Bosworth (1997, personal communication, appendix b) claimed that Tasmania is very close to mainland Australia and is thus vulnerable to the dispersal of introduced species because of this. Such an incident happened in June 1998. A fox of unknown gender arrived in Northern Tasmania via a ship from Melbourne, causing huge community concern and extensive foxhunts. Tasmania is the only Australian state that has no foxes. If foxes established on the island, it would be an ecological disaster. Foxes destroy small mammal populations and have been implicated as a major cause of species extinction on mainland Australia.

In general, natural resource managers and the public in Tasmania are more aware about issues related to the effects of introduced species on biodiversity conservation than their counterparts in Taiwan. For example, Tyson (1997, personal communication, appendix b) stated that the level of coordination between different levels and sections of governmental agencies in Tasmania on

introduced species issues is high. Tasmania has a more integrated approach than Taiwan and has achieved many effective problem outcomes. It can provide Taiwan with a good example to follow because co-ordination between different sections and levels of governmental agencies is needed in Taiwan, especially given its dispersed structure.

Also Tasmanian governmental agencies have more – albeit perhaps still not a sufficient number - biological experts working with decision-makers. For example, Haimes (1997, personal communication, appendix b) stated that the Tasmanian government when tackling introduced species issues, especially in the World Heritage Areas, involves specialist officers who develop management plans for the groups of organisms that are the subject of their specialisation. Without specialists, it may be difficult to locate the presence of an introduced species in the first place, let alone assess the impact of such a species on the natural environment. In Taiwan, there are relatively few specialist officers, suggesting a *prima facie* need for an increase in their numbers.

Both islands have a feral domestic animal problem. In Tasmania, the most serious feral animal is the cat, which is causing a dramatic decline in the populations of native reptiles, birds and small mammals. Haimes (1997, personal communication, appendix b) indicated that the Tasmanian government has spent

a huge amount of funding trying to eradicate feral cats in the World Heritage Areas but has failed. However, the program to eradicate goats has been largely successful. In Taiwan, the most obviously problem is the feral dog. Its impact has been seen mostly around urban environments. Chen (1998, personal communication, appendix b) estimated that there are millions of feral dogs in Taiwan. The responsibility for this problem belongs to several governmental agencies at different levels, with the level of effort insufficient to resolve this problem to date.

More basic data collection on the ecology and biology of native species, environmental impact assessment and strategic planning is needed in relation to damage caused by feral animals on both islands, and especially in Taiwan. Grant (1997, personal communication, appendix b) pointed out that insufficient knowledge of the local ecosystems has led to uncertain assessment of the impact from introduced species. It is essential to research the life cycle of native species and ecosystem dynamics in order to resolve the problem of introduced species.

All interviewees agreed that environmental education is the most fundamental and important means to change the attitudes of both governmental personnel and the public towards biodiversity conservation. For example, in Taiwan, Tsai (1998, personal communication, appendix b) argued that the public should be

educated that the act of abandoning pets and freeing captive animals into the wild harms them rather than being kind to them. It either causes their death through their inability to survive or they become feral animals that threaten the natural ecosystem.

In Tasmania, Bosworth (1997, personal communication, appendix b) stated that it is very important to get the community involved and aware of the introduced species issue and that the only effective way to achieve this is through education programs. This subject is dealt within more detail in question seven.

8.3.2 Question 2

Landcare started as a scheme to mitigate and reverse the degradation of farmland that was caused by European farming practice and land clearance, and developed into a range of conservation activities. A co-operative relationship between stakeholders, communities and government was developed under its aegis. Landcare has raised public awareness of conservation and has proved that action can be taken to stop and repair damage.

Regarding the question of the Landcare movement and the involvement in conservation of governmental agencies and community, interviewees from both islands agreed that the government should lead the public in soil and water conservation and other environmental issues. For example, in Tasmania, Mooney (1997, personal communication, appendix b) believed that the government had to provide the impetus for Landcare work and take leadership responsibility. Similarly, in Taiwan, Chen (1998, personal communication, appendix b) stated that the government has to set an example for the people to follow.

The importance of community involvement was stressed by interviewees in both islands. For example, in Taiwan, Chen (1998, personal communication, appendix b) claimed that it is essential that conservation be workable for the local community. There are a few successful examples of this in Taiwan. For example, some Aboriginal groups are gradually forming voluntary bodies that have become involved in resource management around their land. In Tasmania, Haimes (1997, personal communication, appendix b) stated that the community can get involved in a numbers of different ways. They can become involved in planning, helping rangers doing work on the ground, or they could get involved with taking guided tours in National Parks. This broadens the Landcare concept.

In Tasmania, as well as other states and territories in Australia, the federal government has provided a large amount of funding for Landcare activities. These include Bushcare, Coastcare, Rivercare, and Wildcare. It is a successful initiative with nearly a decade of experience that could provide Taiwan with a model to follow, because Taiwan lacks this kind of positive experience. Yet Bosworth (1997, personal communication, appendix b) stated that the Natural Heritage Trust funding for Landcare, Bushcare and other programs will run out in the year 2001. The state government and local groups will have to fund themselves if and when the Commonwealth withdraws its funding.

Governments in both islands face similar financial constraints and take a similar approach, seeking to attract private enterprise to assist in funding, thereby offsetting future perceived funding shortfalls. For example, in Tasmania, Tyson (1997, personal communication, appendix b) reported that the Tasmanian National Parks and Wildlife Service is looking at sponsorship from private enterprise and one of the aspects of Wildcare is to attract sponsors to provide resources. In Taiwan, Chan (1998, personal communication, appendix b) states that the Yang-ming-shan National Park invites reputable enterprises to fund and cooperate in various campaigns for environmental conservation. For instance, a company donates funds to a large-scale re-vegetation project or provides their products as raffle prizes or gifts to attract and reward more public participation in environmental activities.

Both governments also encourage the community and the public to volunteer their time and effort towards conservation work. For example, in Taiwan, Tsai (1998, personal communication, appendix b) notes there are about two hundred voluntary interpreters (ranger naturalists) who help the Yang-ming-shan National Park by providing interpretation services for the visitors. They provide around twenty thousand hours per year, which saves three to four million New Taiwan Dollars on administrative expenses. Volunteers help the National Park in terms of providing both human resources and financial assistance. It would seem crucial to involve the community in conservation activities. Unless government and public work together, the goals of conservation will be less likely to be implemented.

8.3.3 Question 3

Regarding the structuring of government natural resources agencies, interviewees from both islands agreed that a single integrated agency covering related responsibilities is better than several agencies concerned with different aspects of what are essentially interlinked functions. Though each approach has advantages and disadvantages, the integrated system, it was believed, has more advantages than disadvantages whilst the dispersed system confers fewer benefits.

Mooney (1997, personal communication, appendix b) pointed out that conservation systems in Australia vary across the states and territories. In Tasmania, the National Parks and Wildlife Service looks after all Crown lands; whilst in New South Wales, the National Parks Service only manages National Parks. The New South Wales system is similar to Taiwan's and the perception was that difficulties stem from different departments having opposing opinions on the same subject. To resolve confusion, it is better to have a single department in charge of an integrated function, otherwise responsibilities will overlap different agencies and the outcome will be less effective.

In Taiwan, Tsai (1998, personal communication, appendix b) argued that, where two agencies overlap in their responsibilities, appropriate outcomes will be very difficult to achieve. If related tasks are integrated into one agency, conservation goals will be much easier to implement. From the administrative efficiency viewpoint, environmental protection and nature conservation should be in the same agency and the control of National Parks is better under such an integrated agency.

Tasmania's natural resource management agencies once had a similar structure to Taiwan, but changed in response to its perceived unsuitability, according to Bosworth (1997, personal communication, appendix b). Like Taiwan today, parts

of the conservation function were within a development-driving agency. This leads to conflict and inconsistent policy and decision making for natural resource management. An integrated system can plan to see the whole picture and eliminate the waste of human resources with less budgetary impact, according to Grant (1997, personal communication, appendix b). This also reduces confusion and conflict caused by overlapping responsibilities and different standards in different agencies, according to Tsai (1998, personal communication, appendix b). In addition, an integrated agency can accommodate a pool of experts and issues are centrally focused (Tyson, 1997, personal communication, appendix b). Furthermore, when involved with the threatened species and game management, the National Parks and Wildlife Service has the roles of both reserve and off-reserve manager. It has the power to intervene on private land if necessary to satisfy the requirements of its act (Haimes, 1997, personal communication, appendix b).

In the case of the dispersed system in Taiwan, an advantage may be that the conservation responsibility is spread across more than one agency, providing a greater ownership of some particular issues (Tyson, 1997, personal communication, appendix b). For example, the Council of Agriculture, international trade agencies, and the quarantine and police forces, all work together to stop illegal trading in endangered animals.

Yet in most conservation issues, the variable responses of different agencies will result in inefficiency and even conflict. For example, Chan (1998, personal communication, appendix b) states that in the Yang-ming-shan National Park, collection and treatment of rubbish in different areas is the responsibility of several different agencies. City and local government are responsible when rubbish is situated on their roads, the responsibility of garbage removal around walking tracks belongs to the National Park administration, and construction waste and abandoned cars involve police and traffic authorities. In the latter case, if stolen or abandoned property is involved and the case is not solved, it is left uncollected for a considerable time on the site.

Policy agreement is needed between different agencies before an unintegrated system can change to an integrated system. Mooney (1997, personal communication, appendix b) stated that the *State Coastal Policy 1996* in Tasmania provides an example for Taiwan to follow. This provides the policies for coast and coastline development in Tasmania and considers aspects such as marine farming, tourism, transport and other issues. It is a guide for local governments, marine farmers, the National Parks and Wildlife Service, Forestry Tasmania and all other people and agencies involved. This policy is enforced through the right of public appeal against local government decision on the ground of inconsistency with the policy. After the relevant government agencies have agreed upon and adopted a policy, considerable cooperation is still required.

Tsai (1998, personal communication, appendix b) stated that in the long run, Taiwan needs to change towards an integrated system for better and more efficient natural resource management.

8.3.4 Question 4

Regarding environmental regulations, all interviewees on both islands agreed that environmental laws are the backbone of the implementation of natural resources management (for example, Mooney, 1997; Tsai, 1998, personal communication, appendix b). Nevertheless, although environmental regulations are very important, however, most participants stressed that public understanding and support are the keys to achieving the purpose behind environmental regulations (for example, Bosworth, 1997, personal communication, appendix b). In many cases, members of the public are not aware of environmental laws until they break them (Mooney, 1997, personal communication, appendix b). Education on environmental regulations can reduce the chance of breaking environmental laws due to ignorance and save human resources for law enforcement. Therefore, environmental education is a great tool for preventing transgression and vital for better natural resource management (Haimes, 1997, personal communication, appendix b). Environmental education is very important for both informing

communities of rules and facilitating law enforcement by reducing conflict (Mooney, Tyson, 1997, personal communication, appendix b).

Tasmanian environmental regulations are more adequate and comprehensive than those in Taiwan. Although environmental laws on both islands need to be revised to adapt to changing environment and societal values, environmental regulations require considerable reform in Taiwan (Chan, Tsai, 1998, personal communication, appendix b). Minor amendments are required in Tasmania (Haimes, Grant, 1997, personal communication, appendix b). At the time of interviewing, the Tasmanian *National Park Act* was under process of revision. The involvement of Aboriginal communities in consultation relating to the revision of the Act may provide a model for Taiwan. The ownership of some reserves and significant sites has been transferred from National Parks' authority to the Tasmanian Aboriginal community.

Implementing environmental regulations needs an adequate number of law enforcement officials. National Parks in Taiwan have established police patrols but nature reserves do not have police available for regular patrols. This is the main reason for their disordered state in Taiwan (Tsai, 1998, personal communication, appendix b). In Tasmania, in contrast to Taiwan, there are adequate officers for defending environmental regulations, especially in the

reserve system. Even though park rangers in Tasmania have fully authorized law enforcement power, unlike in Taiwan, they prefer to educate the public, rather than punish offenders (Haimes, 1997, personal communication, appendix b).

8.3.5 Question 5

Regarding the question of international environmental treaties and inter-government conservation cooperation, Taiwan has no official relationship with most countries and is not recognised as a member of the United Nations (UN), because of the international political intervention of the Chinese government (Chen, 1998, personal communication, appendix b). Therefore, Taiwan is not allowed to sign any international treaty or be involved in international conventions or join international organisations. There is no World Heritage Area in Taiwan, and as Tyson pointed out, nomination can only be made by a national government (Tyson, 1997, personal communication, appendix b). Taiwan has tried to nominate sites to be listed as World Heritage Areas but has failed due to it not being recognised as an independent nation by the UN (Chan, 1998, personal communication, appendix b).

Although Taiwan is not a signatory nation for any treaty or convention, it has always abided by protocols and guidelines in the same manner as signatory countries and is continuing to make an effort to return to international society. International politics does not stop Taiwan from contributing its resources towards international cooperation for natural resource management through NGOs in informal contact with other nations (Chen, 1998, personal communication, appendix b). Examples include cooperation with related countries to trace migration routes and supporting international research schemes for biodiversity conservation.

In contrast, Tasmania is involved in implementing international treaties and conventions, for example, the Ramsar treaty and the World Heritage Areas convention. Management experience of Ramsar sites and the Tasmanian World Heritage Areas is valuable, especially for similar sites in Taiwan, for future planning and management in Taiwan when the country can be officially recognised and become a signatory country. Although the Australian federal government signs international treaties and conventions, the Tasmanian state government manages Ramsar sites in Tasmania and the Tasmanian World Heritage Areas. The Commonwealth provides funding for the state government to manage international treaty and convention sites as part of its obligations (Mooney, 1997, personal communication, appendix b). Grant (1997, personal communication, appendix b) stated that there are other international conventions

relating to conservation in which Tasmania is involved. Experience with the Migratory Birds Convention and the International Biodiversity Convention could assist authorities in Taiwan in the future.

8.3.6 Question 6

Regarding the question on issues of pollution and waste management, interviewees in both Taiwan and Tasmania again stressed the important role of environmental education for reducing pollution and waste. For example, Tyson (1997, personal communication, appendix b) stated that a lot of urban environmental problems can be tackled with adequate knowledge through education and adequate planning. There are educational programs that have been designed to tackle issues such as waste disposal, storm water run-off and toxic chemicals in Tasmania. Mooney (1997, personal communication, appendix b) also commented that if people could be informed and educated, environmental problems could be fixed. Chen (1998, personal communication, appendix b) claimed that the most effective way to resolve the water pollution problem is to educate the public to reduce pollutants. However, education was not suggested as an alternative to environmental regulation. Grant (1997, personal

communication, appendix b) stated that education is very important in preventing pollution but the implementation of adequate environmental legislation is vital.

Both islands experience air and water pollution from some industries. For example, Grant (1997, personal communication, appendix b) pointed out that Tasmania has an airborne pollutants problem and water pollution problems, such as those that occur downstream from the Pasminco refinery in Hobart and the Australian Newsprint Mills pulp mill on the Derwent River. Some companies have, in the past, even been exempted by government from environmental regulations. Tasmania has a high unemployment rate and an employer or a company that pollutes would then use employment as a bargaining chip in seeking to refuse to pay for pollution control. The government would then grant them exemptions from some pollution control regulations (Grant, 1997, personal communication, appendix b).

Another common problem for both islands is sewage treatment in the reserve systems. It is an especially important issue at fragile and sensitive sites where the natural balance is easily disturbed. Haimes (1997, personal communication, appendix b) stated that in Tasmania there is a major impact where there is no access to sewerage systems. Because Tasmanian natural ecosystems usually occur in very low nutrient environments, and human effluent has high nutrient

levels, untreated sewage can easily add too many nutrients to the environment. This requires the National Parks and Wildlife Service to develop different types of toilet and sewerage systems. In Taiwan, because of high land-use development, some nature reserves situated in or near metropolitan areas have serious pollution problems. Chen (1998, personal communication, appendix b) stated that a more expanded sewer system and updated sewage treatment plants are vital for tackling water pollution in reserves in the metropolitan areas in Taiwan.

Despite Tasmania's lower population, there is still an airborne pollution problem caused by wood smoke (for heating) from fireplaces, especially around urban areas in winter. Also some mining practices have cause serious heavy metal pollution in the rivers (Grant, 1997, personal communication, appendix b). This not only constitutes a health hazard, but also destroys ecosystems that will require a considerable amount of expensive rehabilitation if they are to recover.

According to Tsai (1998, personal communication, appendix b) the pressure for water treatment and water resource management forces Taiwan to develop technical solutions, for example, to update treatment plants and build new dams for water supply. This has not been proved successful and an integrated

approach, including watershed conservation and sewerage system planning, seems the better solution to water resource management.

Tsai (1998, personal communication, appendix b) also stated that another enormous problem in Taiwan is solid waste treatment. Experience of using technology to tackle waste is only suitable for metropolitan areas, where it can be afforded, in the form of expensive incinerators to burn solid waste. But this also raises other issues, such as air pollution control. The better solution is to convince people to reuse, reduce and recycle, which leads back to the importance of environmental education.

8.3.7 Question 7

Regarding environmental education, all participants considered it the most fundamental and powerful strategy to tackle environmental problems. Haimes (1997, personal communication, appendix b) claimed that education is vitally important for several reasons. It is important to educate people to value and conserve the environment. High education levels tend to correlate with support for the concepts of National Parks and World Heritage Areas. This articulate

social stratum creates pressure to maintain or increase resources, in the long run more effective than enforcement for getting the message of environmentally sound management across. Generally speaking, education encourages people to value the environment so they act with care, and not just in reserves and National Parks. Chan (1998, personal communication, appendix b) claimed that environmental education is very important because it encourages the general public to change their environmental concepts and attitudes towards the environment.

All participants agreed that environmental education has to start as early as possible in order to be effective. Grant (1997, personal communication, appendix b) stated that ultimately the aim should be to have environmental education or environmental studies right down to primary school level. Education can be strong and effective when it is started as early as possible. All interviewees agreed that school education systems can produce a more effective outcome. Children do not have preconceived ideas and values and that allows them to accept environmental values more readily, and they can, in turn, influence their parents and families.

Grant (1997, personal communication, appendix b) stated that, progressively, more and more children understand environmental problems and have influence

over their parents. Both teachers and parents of children are eagerly seeking environmental teaching materials for learning. Governmental agencies and NGOs could provide such assistance and work with teachers to develop teaching materials. Grant (1997, personal communication, appendix b) commented that in Tasmania there is very little coordination of education between governmental agencies but there is an increasing amount of educational material being produced, because there is much demand from teachers, students and parents.

Tyson (1997, personal communication, appendix b) stressed that environmental education is a long-term process and the main thrust needs to be educating the teachers and universities that provide teacher training. In general, teachers' training for environmental education is not adequate, with teachers on both islands not confident about the teaching of environmental education. Both in-service teachers and student teachers urgently need to improve their ability to teach environmental education. The Landcare for Teachers Program in Tasmania provides a useful model for adoption in Taiwan. National Park regulatory regimes on both islands specify education as a main goal. On one hand, National Parks help schools to provide environmental education training to teachers. On the other hand, trained teachers help National Parks in implementing educational goals by teaching children in and about the National Parks.

Although attitude and behaviour toward the environment is more difficult to change in adulthood, it is still very important to utilise education as a tool of communication between natural resource managers and communities. Tsai (1998, personal communication, appendix b) stated that, despite being less efficient, it is still important to promote environmental education for adults.

Governmental agencies on both islands provide education programs and campaigns for the public, though both suffer from lack of funding. Grant (1997, personal communication, appendix b) stated that the Tasmanian National Parks and Wildlife Service suffers from education being a small component of its work, so it does not put enough effort and funding towards public environmental education. The Tasmanian National Parks and Wildlife Service wishes to raise awareness of environmental issues and explain the reasons for, and details of, environmental laws to the public.

Chen (1998, personal communication, appendix b) stated that only by way of enhancing environmental education and changing the conception of the general public about the environment and environmental regulations can conservation be accomplished. On the other hand, natural resource managers need help in developing their leadership and communication skills, particularly in relation to

local communities, in order to ensure better policy and improved practice, and to develop leadership abilities for land management.

Mooney (1997, personal communication, appendix b) stated that land managers and park rangers still need more training in general conservation rules. Most of the time the managers and park rangers have good training in ecology, but they have little training in practical knowledge, such as giving advice on how farmers can save water on their properties. In Tasmania, Mooney argued, the public is not generally as well informed about conservation practices as it is in the large mainland Australian cities.

The ultimate achievement of environmental education would be human beings living in harmony with nature without regulation or reserves, because there would be no need to regulate human behaviour to avoid resource degradation. To reach this goal, environmental education should include ethical theory in the long term and workable practice in the short term. It should teach people how to respect nature and to make their connections between human beings and other creatures. It also should teach people how to behave in the natural environment and interact properly with other creatures in the environment. This is best illustrated through everyday example, in, say, how to develop land whilst avoiding conflict with conservation. Although there is still a long way to go, it is

never too late to start with environmental education (Chen, 1998, personal communication, appendix b).

8.3.8 Question 8

Regarding the question of the relationship between government and Non-Government Organisations and the community, all interviewees considered NGOs and communities to have enormous resources to be utilised. Grant (1997, personal communication, appendix b) considered that the cooperation of NGOs gives the National Parks and Wildlife Service a greater work force. The government still works out the policy but often the NGOs and volunteers and other people can spread the message more quickly and effectively, and can do work on the ground that the National Parks and Wildlife Service does not always have the financial resources to implement. Tsai (1998, personal communication, appendix b) stated that the work of conservation in Taiwan is gradually transforming from government assisting NGOs towards the two working together.

Governments on both islands tend to cultivate the abilities of communities and NGOs to manage environment problems by initial funding and assistance with training, and then letting them take charge of management independently. This trend was opposed by interviewees who consider the government should have the primary responsibility for natural resource management and not totally pass on responsibilities to the community. Bosworth (1997, personal communication, appendix b) stated that we have to be careful that the government does not put full responsibility on to the community when the government should do the core business. It is very important to find the appropriate level of conservation responsibility that the government should hand over to the community.

The main reason governments want to pass on their managing role is that they face more and tighter budget restrictions. Both governments intend to attract more financial support from enterprises and the public. Chen (1998, personal communication, appendix b) explained that governmental agencies in Taiwan have their own budgets that cannot be predicted because they depend on yearly decisions. Therefore, the funding sources from government are not reliable. In addition, especially in Taiwan, lack of human resources for managing natural resources means governments have no choice but to seek assistance from volunteers. Generally speaking, the interviewees thought that community members and volunteers from local NGOs can manage local environments more effectively than outside planners and decision-makers, due to their local

knowledge and ability to apply the peer-pressure effect. Mooney (1997, personal communication, appendix b) stated that the benefit of working with local people is that there is positive peer group pressure. For example, if there are houses along the coastline and some of the residents are members of a Coastcare group working with the National Parks and Wildlife Service, they learn to understand conservation. Those who are not members of the Coastcare group might damage the environment on the reserves. The Coastcare group members will tell offenders not to damage reserves and explain why. This peer group pressure works very well because it does not have the 'us and them' state of mind of law enforcement, but carries the sanction of a respected neighbour.

Tasmania has greater public participation in policy making for natural resource management than Taiwan. For example, there are the National Parks and Wildlife Advisory Council and the World Heritage Area Consultative Committee, both set up by government, and consisting of key stakeholder representatives, to provide policy and practical advice. These bodies include members of NGOs, local government and university academics. Non-Government Organisations in Tasmania have a role in either providing general advice or setting up a particular task for environmental development. In Taiwan, direct involvement from NGOs and communities in the development of environmental policy is still absent.

The successful Landcare movement in Tasmania has triggered many other similar care groups. They are encouraged to improve the local environment, even to the degree of direct involvement in reserve management. Even private property has been offered as part of the reserve system (Bosworth, 1997, personal communication, appendix b). A good example is Chauncy Vale, which is a private wildlife sanctuary and a private reserve under the National Parks and Wildlife Act in Tasmania. Chauncy Vale Wildlife Sanctuary is managed by a group of volunteers and has a field study centre for environmental education.

8.3.9 Question 9

Regarding the question of experience exchange between Taiwan and Tasmania, all participants expressed their willingness to share their expertise in natural resource management. Mooney (1997, personal communication, appendix b) stated that the basic principles of conservation are the same all over the world. The problems are lack of understanding of each other and no contact between the two islands. Tyson (1997, personal communication, appendix b) stated that the Tasmanian National Parks and Wildlife Service has a lot of difficulty in getting approval for resources to allow people to travel and try to take advantage of meetings or conferences to share and exchange experience. There should be

ample opportunity for exchange visits and cooperation between governmental agencies and Non-Government Organisations within the two jurisdictions.

According to Haimes (1997, personal communication, appendix b), due to a limited budget, Tasmania only has informal exchanges with New Zealand and the United Kingdom through staff exchanges or travel or study overseas by staff. Most technical experience interchanges that happen in Tasmania are with other Australian states and territories, and these are not island ecosystems. In Taiwan, most overseas experiences are drawn from Japan and the United States, which do not have a similar-size island environment either. For this reason, all interviewees agreed that through exchanging experiences of nature resource management, both Tasmania and Taiwan could foresee and avoid future mistakes by learning from each other. Mooney (1997, personal communication, appendix b) stated that Tasmania can provide its Landcare experience and advanced planning and management of nature reserve systems to Taiwan (Miao, 1998, personal communication, appendix b). Tasmania can learn of Taiwan's pollution control experience and of its new integrated approach to environmental education. Even though the two governments do not have a formal diplomatic relationship, informal interchanges could occur in areas of mutual interest.

8.4 Summary

From the responses of these key personnel interviews we can see a similar enthusiasm for nature resource management. Interviewees from both islands have similar views on most issues regardless of their different cultural and knowledge backgrounds. This indicates recommendations for improving nature resource management on both islands should be accepted and workable, with minor adjustments in detail.

In general, Tasmania could provide more developed models for Taiwan to follow on most issues, such as biodiversity conservation, community involvement schemes, policy and decision-making process, environmental regulation revision and implementation, governmental structure integration and international cooperation. On the other hand, experience of pollution control and urban related issues from Taiwan could provide lessons for Tasmania. Interchange between the two islands would be beneficial and should be encouraged.

Chapter 9

DISCUSSION AND RECOMMENDATIONS

9.1 Experience exchange

Despite the cultural, political, economic and vast population density differences between Taiwan and Tasmania, most general environmental issues are applicable to both islands and they share a similar physiography, i.e. central high mountain ranges descending towards the coast. There is strong agreement on the benefits of sharing their respective experiences, as evidenced within the key person interviews (chapter eight). This agreement indicates the great potential for positive outcomes from exchanging experiences of natural resource management between the two islands.

The islands of Taiwan and Tasmania can draw lessons from each other for natural resource management. For example, Taiwan lacks experience in establishing and managing World Heritage Areas and Ramsar sites. Tasmania has developed policies and codes of conduct for the management of these

reserves. This not only provides a blueprint for implementation in Taiwan but also allows Taiwan to avoid repeating mistakes. For example, planning and management of the Tasmanian Wilderness World Heritage Area has been criticised as lacking involvement by the community (Russell and Jambrecina, 2001). This lack of communication between government and local communities has caused conflict and consequent problems of implementation. To resolve this, a review has been taken with a view to changing strategy and practice in the interest of improving management outcomes. Taiwan can learn this lesson from Tasmania – that, in any planning and management of nature reserves, consultation and involvement of the local community and the forming of partnerships in management should be undertaken. On the other hand, although Tasmania has far less population, its pollution problem is already serious and may get worse. Taiwan can provide invaluable treatment experience and technology that can provide cost effective solutions to prevent further damage.

There will need to be an informal exchange of experiences and technology between Taiwan and Tasmania since the two islands cannot have diplomatic relationships. The exchange could involve staff visiting related agencies, conferences on issues of mutual interest, and exchanges of relevant information.

The most important experience Tasmania can offer to Taiwan is the evolution of natural resource management regime under the influence of New Public Management. Between 1971 and 2000 changes occurred in National Parks administration associated with the transformation from traditional public administration to New Public Management. Prior to 1987, Tasmanian governmental agencies mainly adopted the framework of traditional public administration. Departmental responsibility was relatively uncomplicated and accepted. In addition, the initial reforms between 1987 to 1992 were minimal in that structure and process were more related to the traditional model. However, the major effect of the New Public Management started in 1993. Since then, the department structure has changed rapidly. Environmental planning and conservation management were integrated in relation to clear objectives to assess performance and budget programs to allocate scarce resources. Since 1998 primary industries (including agriculture) and water resources have been brought into the same department as environmental planning and conservation management, which approaches a holistic approach to natural resource management, with only forestry, energy and mining still outside the framework. Nevertheless, there is still room to improve and further experiments with the managerial model are likely. However, there is the potential problem of demanding too much adaptation too quickly on the part of agency personnel. Further dramatic and rapid changes of agency structure in response to the New Public Management framework might deleteriously affect natural resource management. A period of structural stability in natural resource management is

desirable to bed down existing reforms, to enable agency cultures to adjust, and to manage challenges to morale.

In Taiwan, since the reform of government in 1998, there has been a trend away from traditional administration towards partial privatisation in the absence of any suitable framework for bureaucratic change. As discussed in section 3.4, the experience of Tasmanian governmental reform based on New Public Management could provide an invaluable model for the new government elected in 2000, the first change of government in modern Taiwan's history, for restructuring the governmental framework in Taiwan.

9.2 Governmental structure

There has been no previously published overview of the entire administrative framework related to natural resource management in either Tasmania or Taiwan. This study has indicated that a lack of clear delimitation of responsibilities between agencies hinders the efficiency of natural resource management in Taiwan. For example, natural reserve systems are planned and managed by the Council of Agriculture, Construction and Planning

Administration of the Ministry of Interior, the Forestry Bureau, and municipal and local governments. This complexity of agency responsibility leads to buck-passing from the one to the other and leads to an inferior environmental management.

Davis (1981: 250) notes that, to resolve this, some environmentalists lobby for the restructuring of natural resource agencies in order to give greater prominence to environmental units or to dismember large corporations into smaller and more competitive divisions. This is not incompatible with the New Public Management that has influenced governmental agency reform in Tasmania. Chen, Y. (1999: 18, 19) has also pointed out that in Taiwan the trend towards privatising governmental operations has led to agency reform, which he believes requires review. The governmental agencies on both islands have experienced major structural changes resulting from structure-of-government reform in the case of Taiwan and a change in the state government in Tasmania during the study period. It is predictable that there will be more changes with alterations to the political environment in the future.

It is strongly recommended that agencies from both islands change towards a more integrated governmental structure that can produce clearer natural resource management policies, provide more defined responsibilities for each related

individual agency, and then inform the public about their policies and responsibilities. Government structures are moving towards a holistic approach through amalgamation of agencies with similar responsibilities (chapter 5).

The political environment has a great impact on the restructuring of natural resource agencies. This can be seen from the change in the ruling political party in Tasmania in 1998, which led to an immediate change in governmental structure. Similarly in Taiwan, government reform has led to structural alteration that is now in a transition process. This transition phase has proved to be difficult.

In chapters three, four and five it has been demonstrated that the management of nature reserves needs long-term planning and established management practices, yet the political environment is in constant change. This, on one hand, makes it very difficult to manage natural resources consistently. On the other hand, if the natural resource management policy of the ruling political party is not sustainable, there is a chance for policy change and potentially better (or worse) practice for natural resource management from a new government. Politicians should regard natural resource management as a long-term undertaking and transcend political differences to ensure policy consistency.

9.3 Environmental problems and resolutions

In order to indicate environmental problems, preparation of an environmental report is one of the responsibilities that government should undertake. The government should then act on the report to resolve problems that have been identified. No such report has been prepared by the government in Taiwan to date. In contrast, the Tasmanian government produced its first *State of the Environment Report* in 1997. This report used the stress-response approach, one of four approaches employed in the *Framework for the Development of Environment Statistics* by the United Nations Statistics Office in 1984. This approach focuses on the stresses placed on the environment as a result of human activity and the reactions of the environment to these as depicted in a series of indicators. Such an approach is superior to one of the major alternatives, the media approach, which only organises data on air, water, land and the human environment to depict the state of the natural environment at particular times. The stress-response approach focuses on continuous assessment of environmental change, which involves an understanding of the processes of environmental change, in contrast to the media approach that tends not to emphasise 'human-natural environment' interactions.

Although the stress-response approach is to be preferred to the media approach, the other two approaches, the resource accounting approach and the ecological

approach, have their advantages and should be considered for employment as part of a future environmental report for both Taiwan and Tasmania.

The resource accounting approach traces the flow of natural resources from their extraction from the environment, through successive stages of processing and final use, to their return to the environment as waste or to the economic sector for recycling. This approach requires both accounting and environmental professionals to work together.

The advantage of the resource accounting approach is that it provides a clear cost-benefit assessment for the decision-maker and the public. It is easier to understand but it also has its disadvantages, such as the fact that some resources cannot be valued in monetary terms. Also, there is a tendency to value natural resources by measurable benefit for human utilisation.

The ecological approach looks at a variety of relationships between plants and animals and their environment. This is probably the most difficult approach to be implemented and the least likely approach that government will employ. This approach deals with such aspects as ecological diversity, system dynamics, biomass production, and the productivity of ecosystems. It is not easy to

convince the decision-makers and the public about environmental policy based on an approach that excludes most human interests and interaction.

The author suggests that future environmental reporting for both Tasmania and Taiwan could be based on the stress-response approach and, at the same time, employ other approaches, including the media approach, the resource accounting approach and the ecological approach, in order to prepare a more comprehensive and objective document.

Although there are different environmental problems in Taiwan and Tasmania, both islands need to address biodiversity loss and there is a need for improvements in environmental education. Although the Tasmanian model cannot be directly transferred to Taiwan, and vice versa, many experiences can provide valuable lessons. For example, The Tasmanian *State of the Environment Report* provides a model that Taiwan can employ to help prepare its own report.

In addition, Tasmania's 'Landcare for Teachers Program' and the National Parks and Wildlife Service's 'Summer Program' provide guidelines for the inception or modification of similar programs in Taiwan. Furthermore, the success of private reserves and field study centres in Tasmania also demonstrates that the private

sector can contribute to the conservation of biodiversity and the development of outdoor environmental education.

The author argues that reserve systems constitute a transitional means to conserving natural resources until such time as there is no need to limit human behaviour. Yet, before reaching the stage when human beings live harmoniously with their surrounding environments, it has been demonstrated (in chapter seven) that nature reserves are the best overall tool for conserving biodiversity.

The government and people of Taiwan are committed to global conservation but their voice has been largely unheard because of the international status of the country, which excludes it from joining international organisations and participating in international treaties such as the Ramsar Convention.

There is an excellent potential Ramsar site in Taiwan. Once the application for the first Ramsar site in Taiwan has been approved, Tasmania's experience of managing Ramsar sites could be made available to assist Taiwan. Hopefully, Taiwan will be able to also apply to nominate World Heritage Areas within its jurisdiction, after which the management experiences of Tasmania could be shared in planning to manage future World Heritage Areas in Taiwan.

9.4 Conclusion

At a time when the earth is becoming a global village it is easier to exchange experience with different regions in the world. Taiwan and Tasmania share a similar island character, and have a similar migrant-dominated society. Most residents' origins are from elsewhere with the aborigines now a minority (most people in Taiwan are ethnic Chinese and Tasmanians are predominantly of European descent).

Despite the differences of culture, natural environment and governmental regime which has led to different patterns of land use, there are many natural resource management experiences which could be exchanged. In addition, Australia is looking for its new identity through connecting with Asia, and Taiwan is eager to make connection with other countries, including Australia, and to become a member of the international community.

Tasmania and Taiwan have had only a limited trade relationship so far, but there is now an opportunity to link these two islands through academic interchange and other informal relationships, especially in the field of natural resource management. As this research outcome has demonstrated a great potential for exchange of experiences, the first step will be to understand each other through exchanging visits and holding conferences and cooperating in conservation programs. Hopefully this will enhance the relationship between the islands and benefit both.

Natural resource management involves a wide range of issues and aspects. This study mainly focuses on the terrestrial reserves systems. Marine reserves and other non-reserve areas should be studied in future research to create a more comprehensive picture. Hopefully this research will serve as a catalyst to stimulate the sharing of experiences between Taiwan and Tasmania and recommendations proposed in this study will be considered and employed by governments of both islands to improve their natural resource management regimes.

REFERENCES

Ackerman, E., 1953, *Japan's Natural Resources and Their Relation to Japan's Economic Future*, The University of Chicago Press, U.S.A., translated to Chinese by Yung-wen Jen, 1959, China Culture Publishing, Taipei, Taiwan

Baines, J., 1986, Learning to Live on Planet Earth – The Environmental Approach to Education, *International Journal of Environmental Education and Information*, Vol 5, No 1, Environmental Resource Unit, University of Salford, Salford, UK

Bradstock, R.A., Auld, T.D., Keith, D.A., Kingsford, R.T., Lunney, D., and Sivertsen, 1995, *Conserving Biodiversity: Threats and Solutions*, Surrey Beatty & Sons Pty Limited in association with NSW National Parks and Wildlife Service, Australia

Ballantyne, R.R. and Tooth-Aston, P.J., 1989, In-service Environmental Teacher Training in An Apartheid Education System, *International Journal of Environmental Education and Information*, Vol 8, No 1, Environmental Resources Unit, University of Salford, Salford, UK

Bowden, D., 1990, What Do Environmental Educators Want From A University? Environmental Education Project, Sydney University, in Blight, S., Sautter, R.,

Sibly, J. and Smith, R. (eds), *Our Common Future: Pathways for Environmental Education*, the Proceedings of the Australian Association for Environmental Education International Conference, University of Adelaide, South Australia, 23-28 September 1990, Australian Association for Environmental Education, SA Chapter, South Australia

Brady, B.M., 1991, An Overview of Environmental Education in Ireland, *International Journal of Environmental Education and Information*, Vol 1, No 2, Environmental Resources Unit, University of Salford, Salford, UK

Buxton, C., 1989, *Our Land: LandCare Activities for Upper Primary*, Department of Conservation, Forests and Lands, Victoria, Australia

Calder, M. and Wildy, M., 1990, 'Think Globally – Act Locally' Environmental Education With Primary Classes, in Blight, S., Sautter, R., Sibly, J. and Smith, R. (eds), *Our Common Future: Pathways for Environmental Education*, the Proceedings of the Australian Association for Environmental Education International Conference, University of Adelaide, South Australia, 23-28 September 1990, Australian Association for Environmental Education, SA Chapter, South Australia

Chelliah, T., 1990, Environmental Education in the Asia/Pacific Region: Growing Programs and Changing Perspective, in Blight, S., Sautter, R., Sibly, J.

and Smith, R. (eds), *Our Common Future: Pathways for Environmental Education*, the Proceedings of the Australian Association for Environmental Education International Conference, University of Adelaide, South Australia, 23-28 September 1990, Australian Association for Environmental Education, SA Chapter, South Australia

Chen, C., 1994, *An Evaluation of the Landcare for Teachers Program in the Context of Environmental Education*, Masters thesis, Centre for Environmental Studies, Department of Geography and Environmental Studies, University of Tasmania, Australia

Chen, P., 1993, *Infusion Model in Taiwan, ROC, Is It Realistic?*, a background paper for UNESCO ASIA-PACIFIC Regional Experts' Meeting on Overcoming the Barriers to Environmental Education Through Teacher Education, 5-7 July 1993, Griffith University, Brisbane, Australia

Chen, Y., 1998, *The Essays of National Rescuing Chi-lan Formosan Cypress Forest Movement* [in Chinese], Centre for Studies of Taiwan Ecology, Taichung, Taiwan

Chen, Y., 1999, *The Diary of National Rescuing Chi-lan Formosan Cypress Forest Movement* [in Chinese], Ai-chi Book Co., Kaohsiung, Taiwan

Chen, Y., 2000, *The Diary of National Rescuing Chi-lan Formosan Cypress Forest Movement (continual): Legend and Vicissitude of Formosan Cypress Fog Forest* [in Chinese], Ai-chi Book Co., Kaohsiung, Taiwan

Clacherty, A.J., 1993, Environmental Literacy and the Technicist World View: Towards a New Conceptualisation, *International Journal of Environmental Education and Information*, Vol 12, No 2, Environmental Resources Unit, University of Salford, Salford, UK

Commonwealth of Australia, 1987, *Environmental Education – Past, Present and Future*, the Proceedings of the Third National Environmental Education Seminar and Workshops, 11-13 February 1987, Ursula College, Australian National University, Australian Government Publishing Service, Canberra, Australia

Commonwealth of Australia, 1993, *Landcare Information: Land, Water and Vegetation Programs 1994-1995*, Australian Government Publishing Service, Canberra, Australia

Cooper, R.D., and Smith, B.F., 1989, Environmental Education in an Urban Setting: Old Problems – New Perspective, *International Journal of Environmental Education and Information*, Vol 6, No 2, Environmental Resources Unit, University of Salford, Salford, UK

Construction and Planning Administration, 1996a, *An Illustrated Guide to the Green Networks* [in Chinese], Construction and Planning Administration, Taipei, Taiwan

Construction and Planning Administration, 1996b, *Toward the 21st Century for High Quality Living Environment* [in Chinese], Construction Policy White Paper, National Parks and Green Land Section, Taipei, Taiwan

Common Wealth Magazine, 1996, *Environment Taiwan* [in Chinese], June special edition, Taipei, Taiwan

Considine, M., and Painter, M., 1997, *Managerialism: the great debate*, Melbourne University Press, Australia

Council of Agriculture, 1996, *Brief Introduction of Various Governmental Agencies and their Administrative Achievement* [in Chinese], Government Information Office, Taipei, Taiwan

Council of Agriculture, 1997, *Brief Account of Natural Reserves Setting in Taiwan* [in Chinese], Council of Agriculture, Taipei, Taiwan

Davis, B. 1980, *National Parks and the Australian Heritage: Issues and Research*, University of Tasmania Occasional Paper 27, Hobart, Australia

Davis, B., 1981, *Characteristics and Influence of the Australian Conservation Movement: An Examination of Selected Conservation Controversies*, PhD thesis, University of Tasmania, Hobart, Australia

Department of Parks, Wildlife and Heritage, 1992, *Corporate Plan*, Hobart, Australia

Department of Primary Industry and Fisheries Tasmania, 1992, *Tasmania Decade of Landcare Plan*, Department of Primary Industry and Fisheries Tasmania, Australia

Department of Primary Industry and Fisheries Tasmania, 1996, *Annual Report 1995/96*, Hobart, Australia

DPIWE, 2000, *Strategic framework for visitor services in Tasmania's parks and reserves*, Parks and Wildlife Service Tasmania, Department of Primary Industries, Water and Environment, Hobart, Australia

Dyer, K., 1994, Subverting the Dominant paradigm, in Shearman, D. (ed), *Environment South Australia*, the bi-monthly newsletter of the Conservation Council of SA Inc., May/June, Vol 3, no 2, Adelaide, Australia

Eagles, P. and Richardson, M., 1992, The Status of Environmental Education at Field Centers of Ontario Schools, *Journal of Environmental Education*, Vol 23, No 4, USA

Environmental Education Committee, 1993, *Environmental Education Three Year Plan* [in Chinese], Ministry of Education, Taipei, Taiwan

Fensham, P.J., 1986, Environmental Education in Australia Since Tbilisi- A National Perspective, *International Journal of Environmental Education and Information*, Vol 5, No 4, Environmental Resources Unit, University of Salford, Salford, UK

Fensham, P.J., 1987, Environmental Education – a Tbilisi Benchmark, in Commonwealth of Australia, *Environmental Education – Past, Present and Future*, the Proceedings of the Third National Education Seminar and Workshops, 11-13 February 1987, Ursula College, Australian National University, Australian Government Publishing service, Canberra, Australia

Fien, J., 1993a, Teaching for a Sustainable World: A New Agenda for Teacher Education, in Fien, J. (ed), *Teaching for a Sustainable World: Environmental and Development Education Project for Teacher Education*, Teacher Kit, Australian Association for Environmental Education Inc. Brisbane, Australia

Fien, J., 1993b, *Teacher Education for Environmental Education in Australia*, Country Report for UNESCO ASIS-PACIFIC Regional Experts' Meeting on Overcoming the Barriers to Environmental Education Through Teacher Education, 5-9 July 1993, Griffith University, Australia

Forestry Tasmania, 1996, *Annual Report 1995-96*, Hobart, Australia

Golding, E., 1990, Kids for Landcare: A Cross Curriculum Package, in Blight, S., Sautter, R., Sibly, J. and Smith, R. (eds), *Our Common Future: Pathways for Environmental Education*, the Proceedings of the Australian Association for Environmental Education International Conference, University of Adelaide, South Australia, 23-28 September 1990, Australian Association for Environmental Education, SA Chapter, South Australia

Government Information Office, 1993, *The Republic of China Yearbook 1994*, Taipei, Taiwan

Government Information Office, 1995, *The Republic of China Yearbook 1995*, Taipei, Taiwan

Greenall, A., 1980, *Environmental Education for Schools*, Curriculum Development Centre, Canberra, Australia

Greenall, A., 1988, Environmental Education, in Hundloe, T. and Neumann, R. (eds), *Environmental Practice in Australia*, the Proceedings of the Conference – Environmental Practice: the Vital Profession for Australia's Future, Sydney 19-29 November, 1987, Environmental Institute of Australia Inc., Australia

Hayata, B., 1908, *Flora montana Formosae*, Journ. Coll. Sci. Univ. Tokyo, Japan

Heinemann, R., 1995, *Heinemann primary atlas*, Reed International Books Australia Pty Ltd., Melbourne

Hickey, S., 1987, Conference Report, in Cubit, S. (ed), *Outdoor Education – Environment*, No 7, November, 1987, Committee On Outdoor Education Experience (COOEE), Department of Education and the Arts, Tasmania, Australia

Hobart City Council, 2000, *1999~2000 Annual Report*, Hobart, Australia

Hobart City Council, 1997, *Directory of Services 1997*, Hobart, Australia

Hobson, M. and Stadler, T., 1991, Landcare: Educating the Caretakers of Tomorrow's World, in Roberts, B. and Schulz, M. (eds), *Runs on the Board – A Stocktaking of Progress and Constraints in the Australian Land Care Movement 1988-1991*, based on papers presented at the Annual Conference on the Soil and Water Conservation of Australia, University of Southern Queensland, Toowoomba, November 1991, land Use Study Centre, Queensland, Australia

Howe, R. and Disinger, J., 1991, environmental education research news, *The Environmentalist*, Vol 11, no 1, Australia

Huang, W., 1985, *The Study of Management-policy of National Parks in Taiwan*, Masters thesis [in Chinese], National Taiwan University, Taipei, Taiwan

Hughes, O. E., 1998, *Public management and administration: an introduction*, second edition, MacMillan Education Australia Pty. Ltd., Melbourne, Australia

Hunwick, J., 1990, The Importance of a Sense of Place – and Using a Computer, in Blight, S., Sautter, R., Sibly, J. and Smith, R. (eds), *Our Common Future: Pathways for Environmental Education*, the Proceedings of the Australian Association for Environmental Education International Conference, University of

Adelaide, South Australia, 23-28 September 1990, Australian Association for Environmental Education, SA Chapter, South Australia

Hydro-electric Corporation, 1997, *Environmental Report 1996*, Hobart, Australia

James, R.L., 1987, Outdoor Education, in Cubit, S. (ed), *Outdoor Education – Environment*, No 7, November, 1987, Committee On Outdoor Education Experience (COOEE), Department of Education and the Arts, Tasmania, Australia

Keating, M., 1989, *Quo Vadis: Challenges of the New Managerialism*, Address to RAIPA, Perth, 12 April, Australia

Kerr, A.G., 1987, Summation and Closing Seminar, in Commonwealth of Australia, *Environmental Education – Past, Present and Future*, the Proceedings of the Third National Environmental Education Seminar and Workshops, 11-13 February 1987, Ursula College, Australian National University, Australian Government Publishing Service, Canberra, Australia

Langmore, J., 1987, Opening Address, in Commonwealth of Australia, *Environmental Education – Past, Present and Future*, the Proceedings of the Third National Environmental Education Seminar and Workshops, 11-13

February 1987, Ursula College, Australian National University, Australian Government Publishing Service, Canberra, Australia

Loubser, C.P. and Ferreira, J.G., 1992, Environmental Education in South Africa in Light of the Tbilisi and Moscow Conference, *Journal of Environmental Education*, Vol 23, No 4, 1992, USA

Lowe, D., 1984, *The Price of Power: The Politics Behind the Tasmanian Dams Case*, The MacMillan Company of Australia Pty Ltd, South Melbourne, Australia

Lubczenko, V., 1991, *Saltwatch: A Curriculum Package for Schools*, Saltwatch Action Program, Department of Conservation and Environment, East Melbourne, Australia

McNeely, J., & Miller, K., 1984, *National Parks Conservation and Development.* Smithsonian Institution Press, Washington, DC, USA

McPhail, I., 1994, Learning – acting – the future, in Shearman, D. (ed), *Environment South Australia*, the bi-monthly newsletter of the Conservation Council of SA Inc, May/June 1994, Vol 3, no 2, Adelaide, Australia

Ministry of Education, 1991, *Establishing Essentials of the Environmental Protection Division* [the approved draft version in Chinese], Taipei, Taiwan

Nelson, F., 1983, *Through Aboriginal Eyes*, video, Resource Services, Division of services, Department of Education NSW, Australia

Niedermeyer, F.C., 1992, A checklist for reviewing Environmental Education programs, *Journal of Environmental Education*, Vol 23, No 2, USA

O'Faircheallaigh, C., Wanna, J. and Weller, P., 1999, *Public sector management in Australia: new challenges, new directions*, second edition, MacMillan Education Australia Pty. Ltd., Melbourne, Australia

Parliament of the Commonwealth of Australia, 1980, *South West Tasmania and Hydro-electric power development*, Parliamentary Paper No. 146/1980, House of Representatives Standing Committee on Environment and Conservation Report, August 1980, The Commonwealth Government Printer, Canberra, Australia

Parry, L., 1987, Environmental Education in Australia: Some Recent Curriculum Developments, *International Journal of Environmental Education and Information*, Vol 6, No 1, Environmental Resources Unit, University of Salford, Salford, UK

Radbone, I., 1990, Effective Affective Learning For The Environment, in Blight, S., Sautter, R, Sibly, J. and Smith, R., (eds) *Our Common Future: Pathways for Environmental Education*, the Proceedings of the Australian Association for Environmental Education International Conference, University of Adelaide, South Australia, 23-28 September 1990, Australian Association for Environmental Education, SA Chapter, South Australia

Roberts, B., 1991a, *The Land Care Movement in Australia as a Basis for Rangeland Extension*, International Rangeland Congress, Montpellier, France

Roberts, B., 1991b, *Lessons from the Australian Land Care Movement*, International Conference on Sustainable Land Management, Napier, New Zealand

Roberts, R., 1989, *Land Conservation in Australia – A 200 Year Stocktake*, Soil Conservation Service of NSW, Australia

Robottom, I., Markowitz, N. and Wright, M., 1985, School-based Environmental Education: An Action Research Report, *International Journal of Environmental Education and Information*, Vol 4, No 1, Environmental Resources Unit, University of Salford, Salford, UK

Robottom, I., 1987, The Dual Challenge for Professional Development in Environmental Education, in Commonwealth of Australia, *Environmental Education – Past, Present and Future*, the Proceedings of the Third National Environmental Education Seminar and Workshops, 11-13 February 1987, Ursula College, Australian National University, Australian Government Publishing Service, Canberra, Australia

Russell, J. and Jambrecina, M., 2001, Wilderness and Cultural Landscapes: shifting management emphases in the Tasmanian Wildness World Heritage Area, *Australian Geographer*, Vol 32, No3

Schmiechen, J., 1994, Environmental Education on Common Ground – The Aboriginal Dimension, in Shearman, D. (ed), *Environment South Australia*, the bi-monthly newsletter of the Conservation Council of SA Inc., May/June 1994, vol 3, No 2, Adelaide, Australia

Simmons, D.H., 1989, More Infusion Confusion: A Look at Environmental Education Curriculum Materials, *Journal of Environmental Education*, Vol 20, No 4, USA

Spork, H., 1992, Environmental Education: A Mismatch Between Theory and Practice, in Robottom, L. (ed), *Australian journal of Environmental Education*,

Vol 8, August, Australian Association for Environmental Education Inc. Australia

Sustainable Development Advisory Council, 1997a, *State of the Environment Tasmania, Volume 1 Conditions and trends*, Hobart, Australia

Sustainable Development Advisory Council, 1997b, *Tasmania State of the Environment Report, Findings & Recommendations volume 2 draft*, Hobart, Australia

Taipei Municipal Government, 1994, *Department of Environmental Protection Official Introduction* [in Chinese], Taipei, Taiwan

Tasmanian Conservation Trust Inc, 1987, *Tasmanian mammals: A field guide*, Tasmanian Conservation Trust Inc, Hobart, Australia

Tasmanian Department of Environment and Land Management, 1996, Annual Report 1995-96, Hobart, Australia

Tilbury, D., 1994, The International Development of Environmental Education: A Basis for a Teacher Education Model?, *International Journal of Environmental Education and Information*, Vol 13, No 1, Environmental Resources Unit, University of Salford, Salford, UK

Traynor, S., 1990, Shaping Attitudes and Behaviour: How Do We Do It? In Blight, S., Sautter, R., Sibly, J. and Smith, R. (eds), *Our Common Future: Pathways for Environmental Education*, the Proceedings of the Australian Association for Environmental Education International Conference, University of Adelaide, South Australia, 23-28 September 1990, Australian Association for Environmental Education, SA Chapter, South Australia

UNESCO, 1983a, *Trends, Needs and Priorities of Environmental Education Since the Tbilisi Conference: An Overview* (Preliminary report of a world survey), the Environmental Education Series 1, UNESCO-UNEP International Environmental Education Programme, Division of Science, Technical and Vocational Education, UNESCO

UNESCO, 1983b, *Educational Module on Conservation and Management of Natural Resources*, the Environmental Education Series 3, UNESCO-UNEP International Environmental Education Programme, Division of Science, technical and Vocational Education, UNESCO

UNESCO, 1983c, *Educational Module on Environmental Problems in Cities*, the Environmental Education Series 4, UNESCO-UNEP International Environmental Education Programme, Division of Science, Technical and Vocational Education, UNESCO

Wadsworth, Y., 1984, *Do It Yourself Social Research*, Victorian Council of Social Service, Melbourne Family Care Organisation in association with Allen & Unwin, Australia

Wals, A., 1992, Young Adolescents' Perceptions of Environmental Issues: Implications for Environmental Education in Urban Settings, in Robottom, I. (ed), *Australian Journal of Environmental Education*, Vol 8, August, Australian Association for Environmental Education Inc. Australia

Water Resources Bureau, 1996, *Water Resources Policy White Paper* [in Chinese], Taipei, Taiwan

Wilson, R.A., 1993, The Importance of Environmental Education at the Early Childhood Level, *International Journal of Environmental Education and Information*, Vol 12, No 1, Environmental Resources Unit, University of Salford, Salford, UK

Zhang, H., 1988, *The Study of Agenda setting in Public Policy – Case Study of National Parks' Policy in Taiwan*, Masters thesis [in Chinese], National Zheng-zhi University, Taipei, Taiwan

http://www.goodpractice.tased.edu.au/tasmania.htm

http://www.coa.gov.tw/external/preserve/preserve/english/nat_env/

natural_env.htm

http://www.lib.utexas.edu/Libs/PCL/Map_collection/middle_east_and_asia/

Taiwan.GIF

http://2000.taroko.gov.tw/

http://www.environment.gov.au/bg/environm/wetlands/ramsar/ramindex.htm

http://www.biodiversity.environment.gov.au/environm/wetlands/site6.htm

http://www.biodiversity.environment.gov.au/environment/wetlands/ramaust.htm

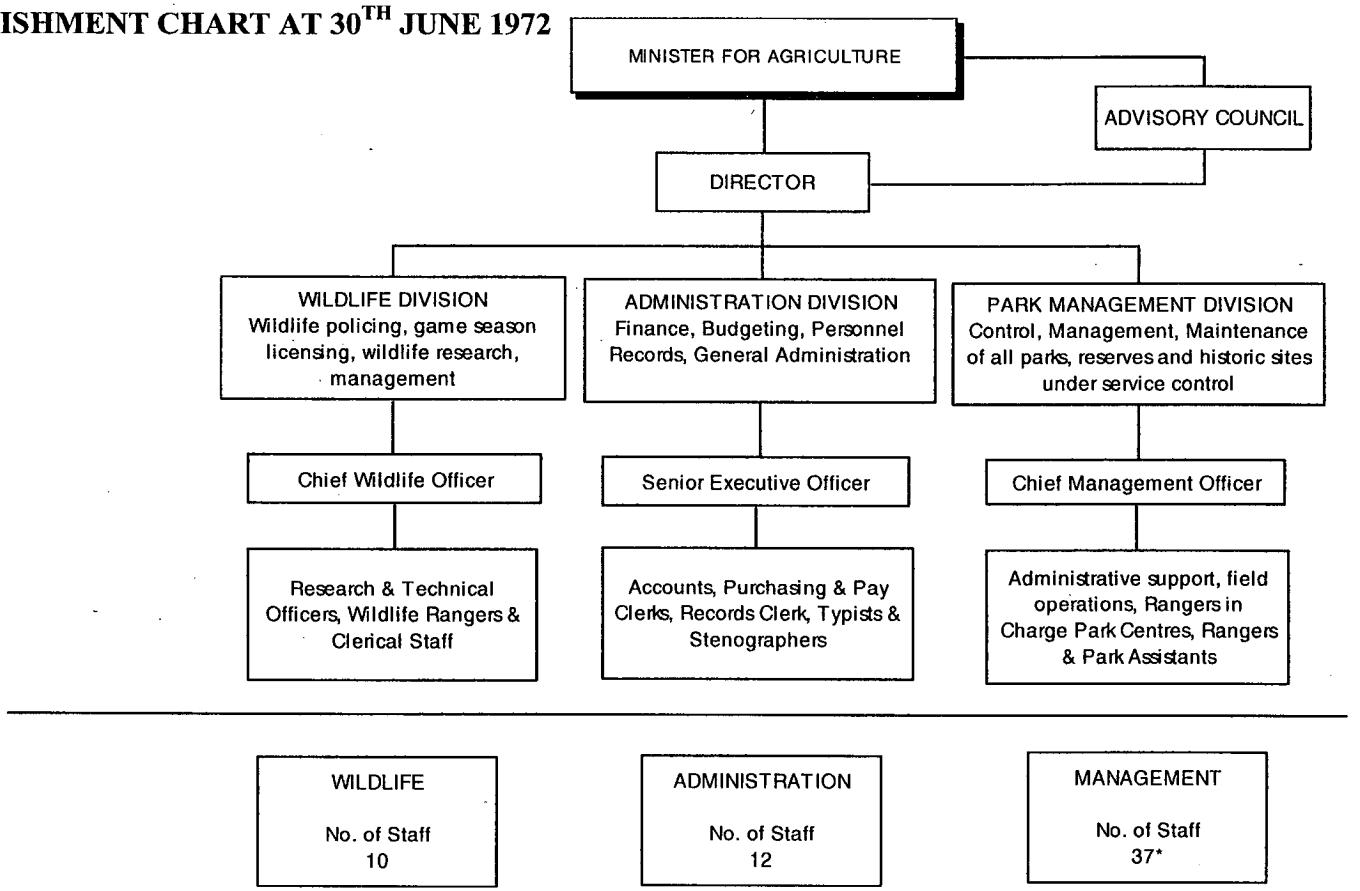
http://com5.iis.sinica.edu.tw:8000/~cwbf/issue/ebfsb.html

http://debut.cis.nctu.edu.tw/~yklee/NetZoo/Spoonbill/whats_e.htm

http://www.dpiwe.gov.au/chart.gif

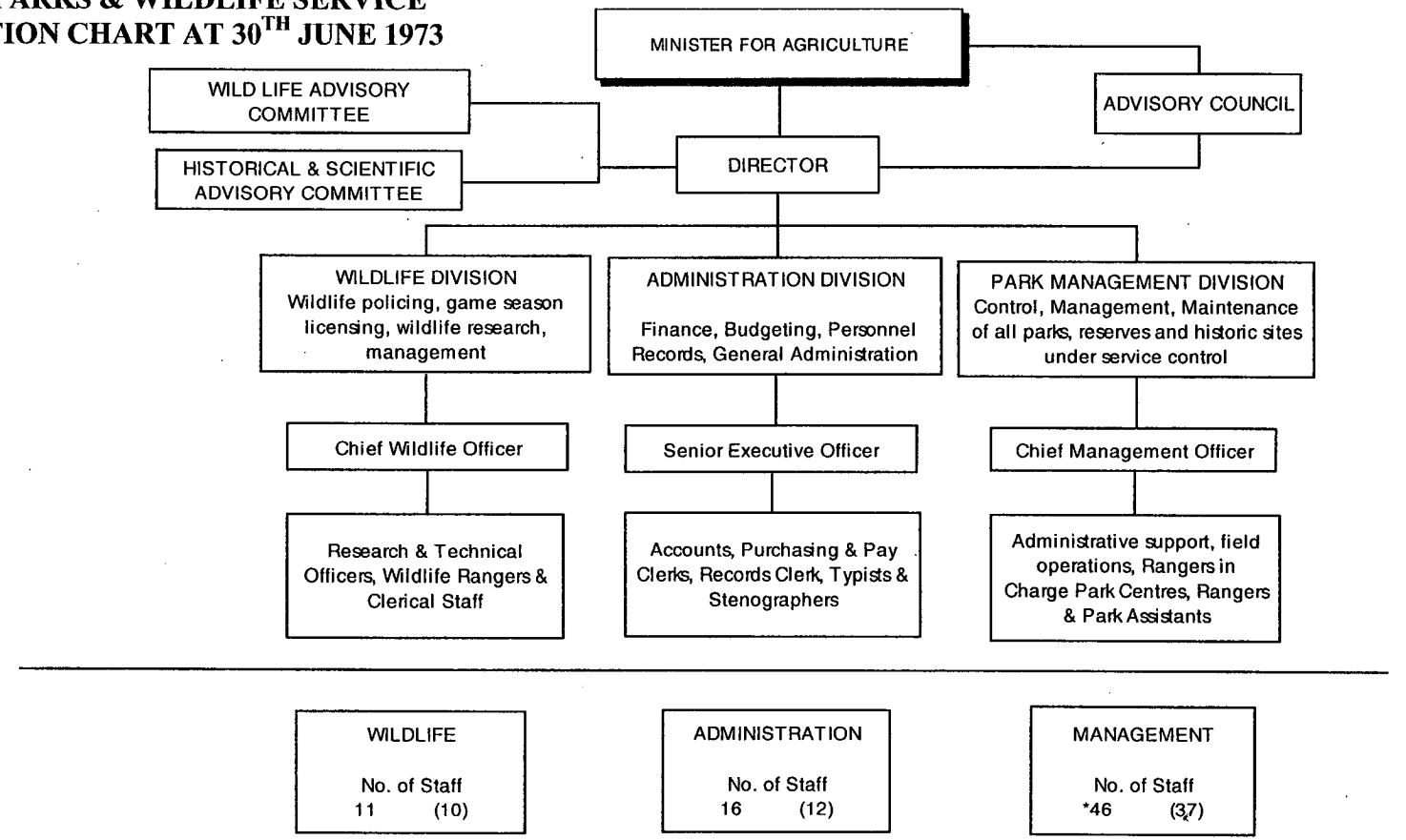
APPENDIX A

NATIONAL PARKS & WILDLIFE SERVICE ESTABLISHMENT CHART AT 30TH JUNE 1972



- Plus approx. 30 casuals & part-time employees.

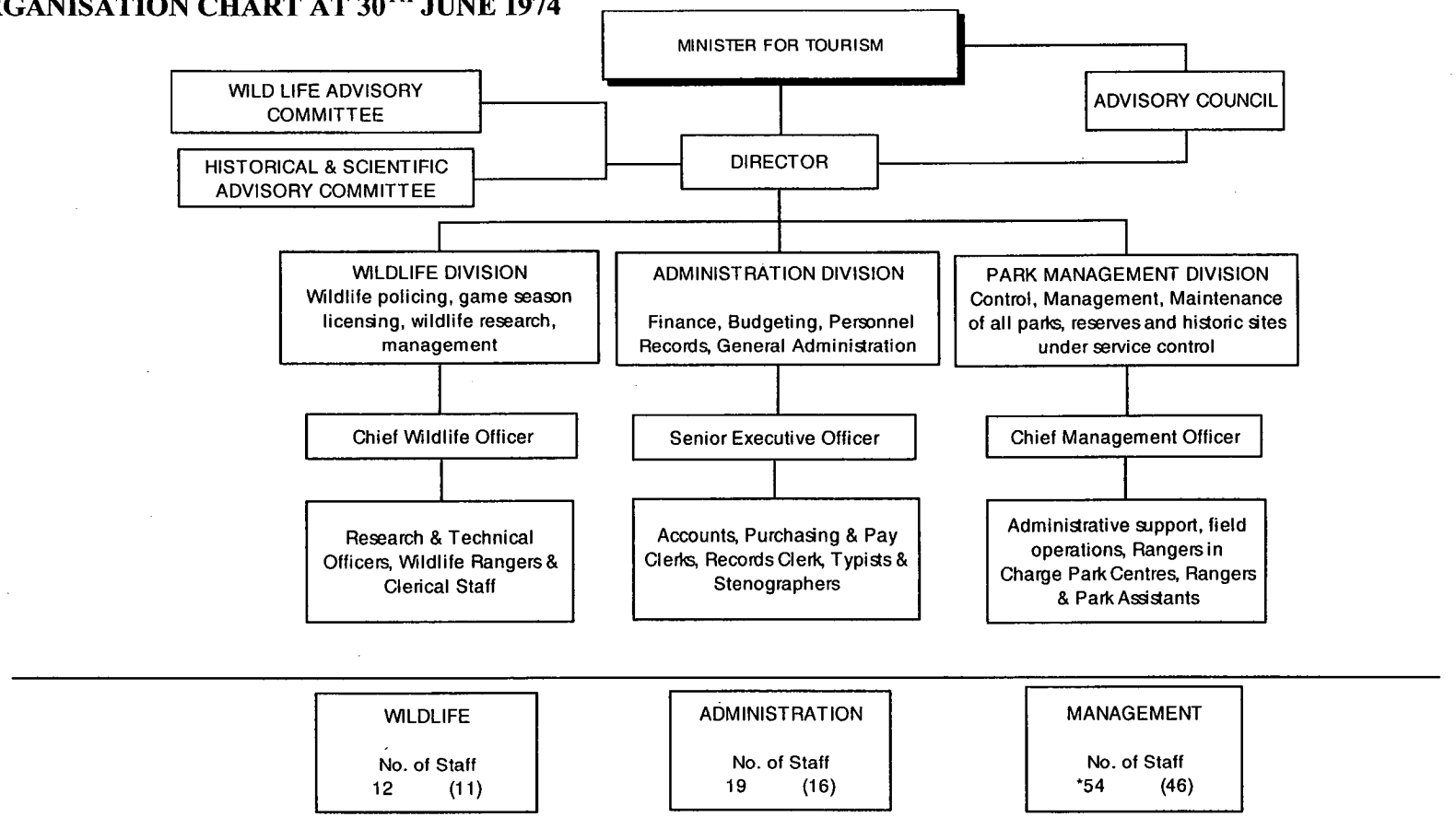
NATIONAL PARKS & WILDLIFE SERVICE ORGANISATION CHART AT 30TH JUNE 1973



(Total June 1972 89-59 permanent, 30 casuals)
(Total June 1973 100-73 permanent, 27 casuals)

*Plus approx. 27 casuals and part-time employees including five employed in Wildlife or Administrative duties.

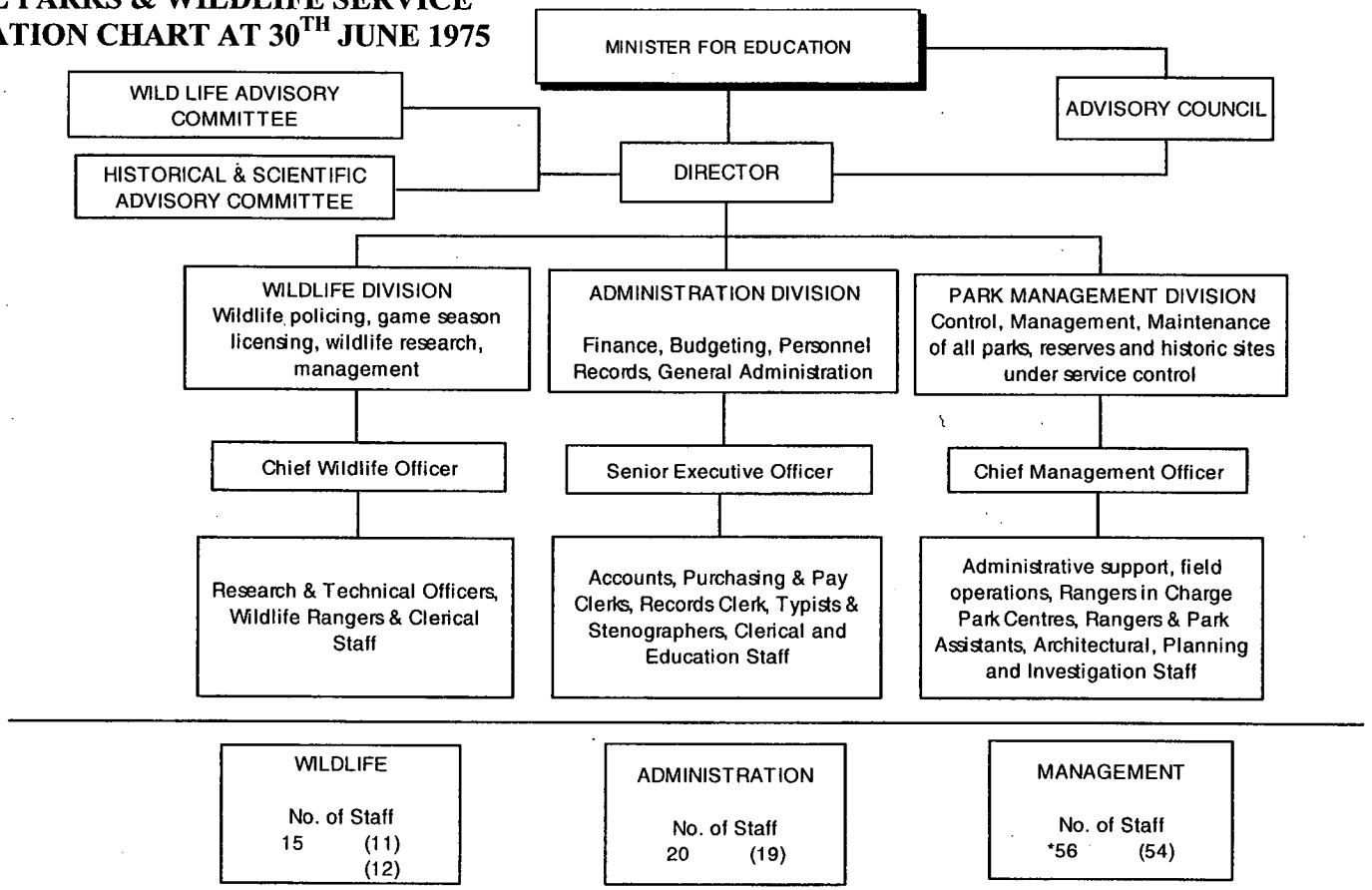
NATIONAL PARKS & WILDLIFE SERVICE ORGANISATION CHART AT 30TH JUNE 1974



Total June 1973 100-73 full-time, 27 casual and part-time.
Total June 1974 109-85 full-time, 24 casual and part-time.

*Plus approx. 24 casuals and part-time employees including seven employed in Wildlife or Administrative duties.

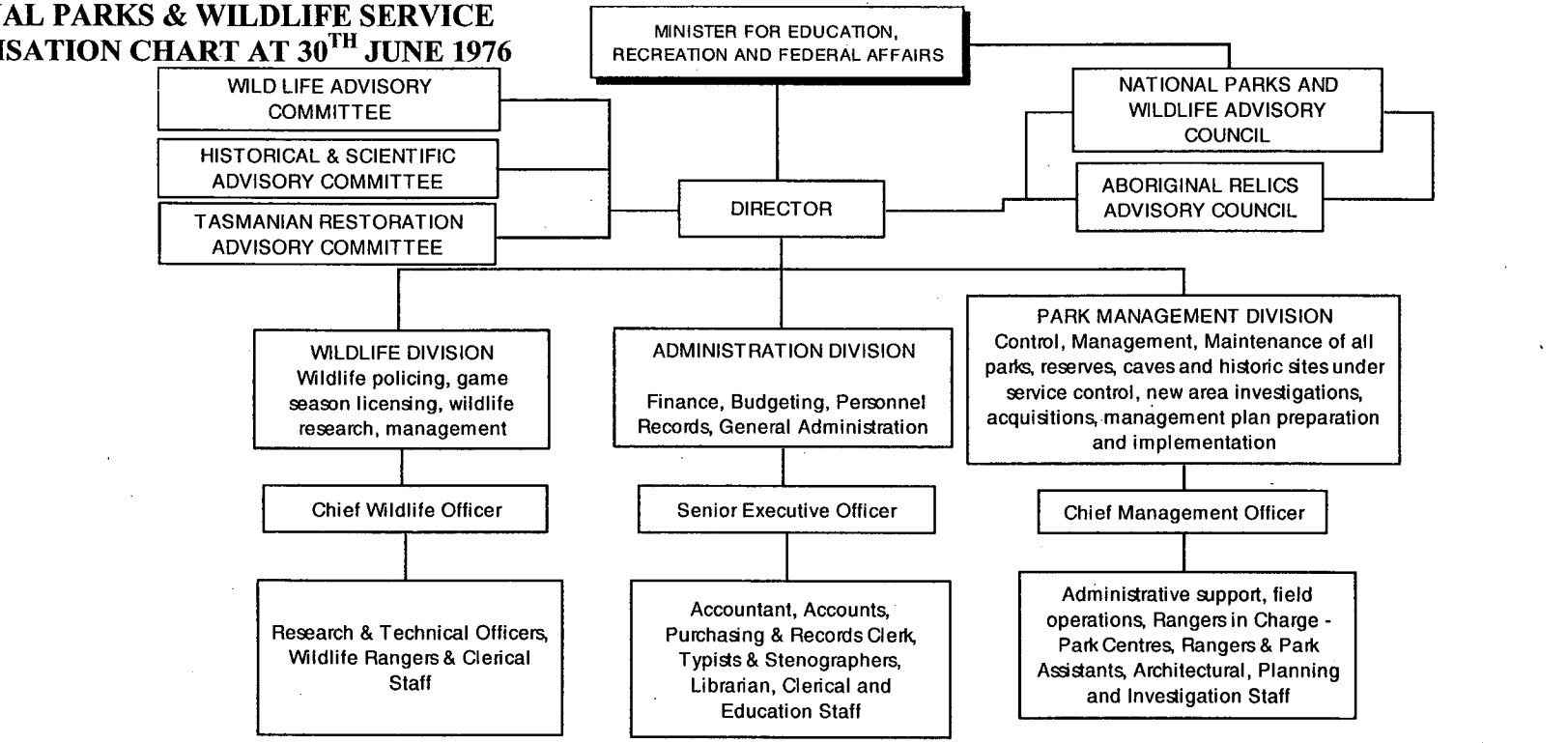
NATIONAL PARKS & WILDLIFE SERVICE ORGANISATION CHART AT 30TH JUNE 1975



Total June 1973 100-73 full-time, 27 casual and part-time.
Total June 1974 109-85 full-time, 24 casual and part-time.
Total June 1975 118-91 full-time, 27 casual and part-time.

*Plus approx. 27 casuals and part-time employees including five employed in Wildlife or Administrative duties.

NATIONAL PARKS & WILDLIFE SERVICE ORGANISATION CHART AT 30TH JUNE 1976

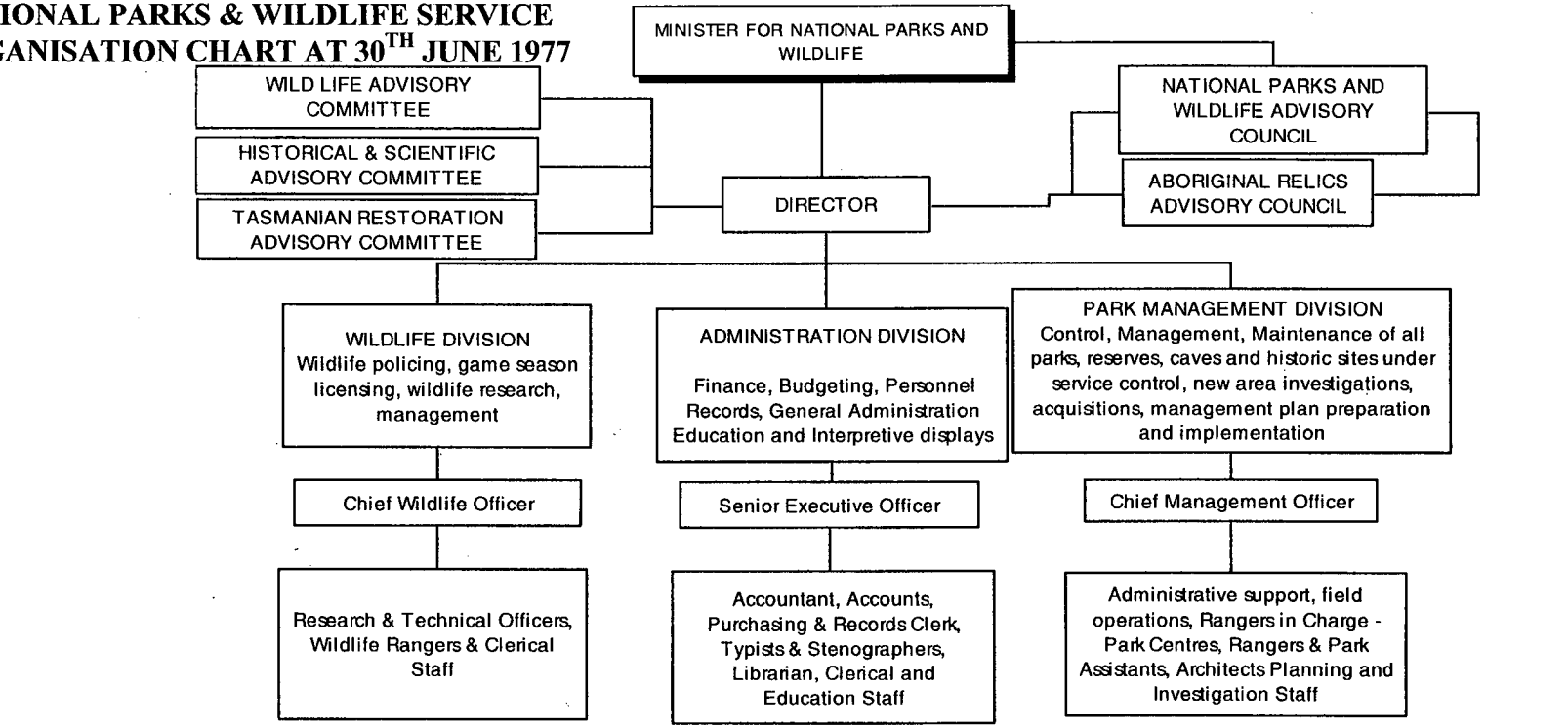


WILDLIFE	ADMINISTRATION	MANAGEMENT
No. of Staff	No. of Staff	No. of Staff
20 (15)	25 (20)	*71 (56)

Total June 1973-100 (73 full-time, 27 casual and part-time.)
Total June 1974-109 (85 full-time, 24 casual and part-time.)
Total June 1975-118 (91 full-time, 27 casual and part-time.)
Total June 1976-144 (116 full-time, 28 casual and part-time).

*Plus approx. 28 casuals and part-time employees including five employed in Wildlife or Administrative duties.

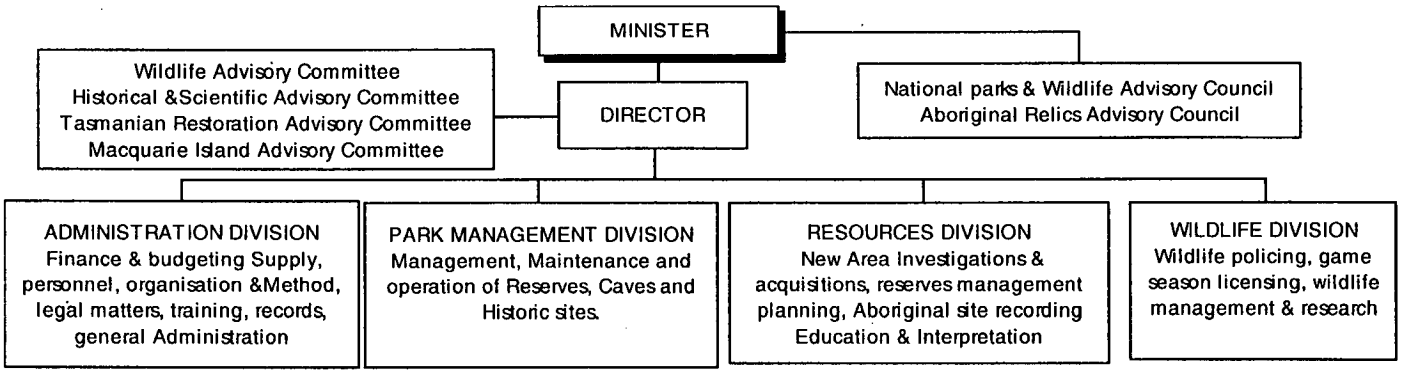
NATIONAL PARKS & WILDLIFE SERVICE ORGANISATION CHART AT 30TH JUNE 1977



Total June 1973-100 (73 full-time, 27 casual and part-time.)
Total June 1974-109 (85 full-time, 24 casual and part-time.)
Total June 1975-118 (91 full-time, 27 casual and part-time.)
Total June 1976-144 (116 full-time, 28 casual and part-time)
Total June 1977-275 (128 full-time, 147 casual and part-time)

*Plus approx. 25 casuals and part-time employees employed in various Divisions under Ministerial approval, and 122 persons under State Government Unemployment Relief Scheme.

NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART BY FUNCTION & STAFF NUMBERS AT 30TH JUNE 1978



Senior Executive Officer
Executive Officer
Accountant
Pay Clerk
Supply clerk
Personnel clerks
Typists & Stenographers
Librarian
General clerks
Total: 32

Chief Management Officer
Operations officer
Architect & Assistant
Protection Officer
Field Operations staff
Inspectors
Senior Rangers
R.I.C's Park Centres
Ranger & Park Assistants
Administrative staff
Total: 70 + 18 part-time

Chief Resources Officer
Planning & Investigation Staff
Education & Interpretation officer
Research Officer – Aboriginal sites &Relics
Total: 11 + 7 temporary

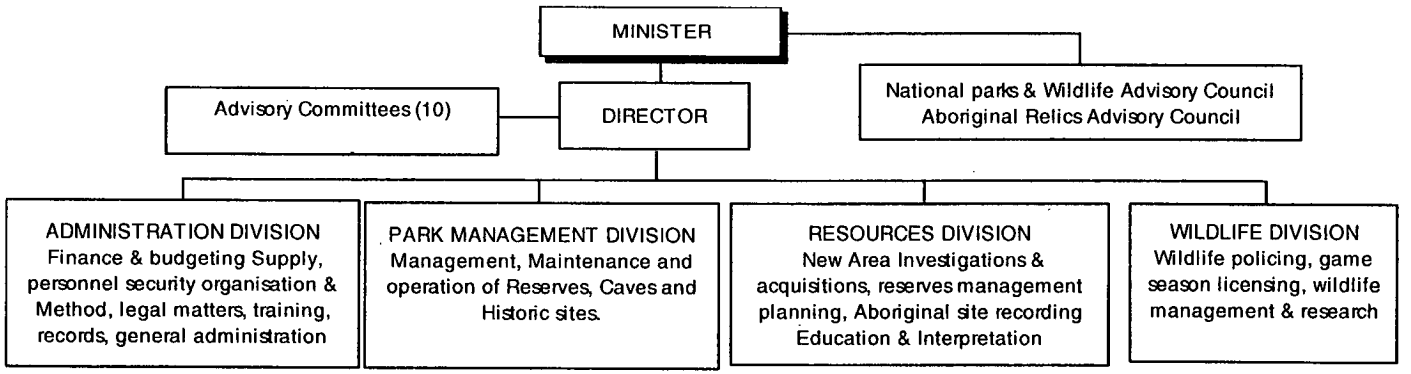
Chief Wildlife Officer
Research & Tech. Officer
Wildlife Rangers
Administrative staff
Total: 21

Unemployment Relief: 20

Administration Division 32
Parks Management Division 88
Resources Division 18
Wildlife Division 21
Unemployment Relief 20
Part-time/Advisory 3
Trainees... 11
Staff Establishment 193*

*In addition to the departmental establishment, the Service is responsible for Administrative/ Accounting functions relating to the National Estate Tasmania, (staff 2), and the South West Resources Survey (staff 5).

NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART BY FUNCTION & STAFF NUMBERS AT 30TH JUNE 1979



Senior Executive Officer
Executive Officer
Accountant
Training Officer
Accounts Clerk
Pay Clerk
Supply clerk
Personnel clerks
Typists & Stenographers
Librarian
General clerk
Launceston Office Staff
Total: 34 (31 + 3 temp)

Chief Management Officer
Operations officer
Architect & Assistant, Supervisor
Protection Officer
Field Operations staff
Inspector
Senior Rangers
R.I.C's Park Centres
Ranger & Park Assistants
Administrative staff
Total: 98 (77 + 21 part-time/temp)

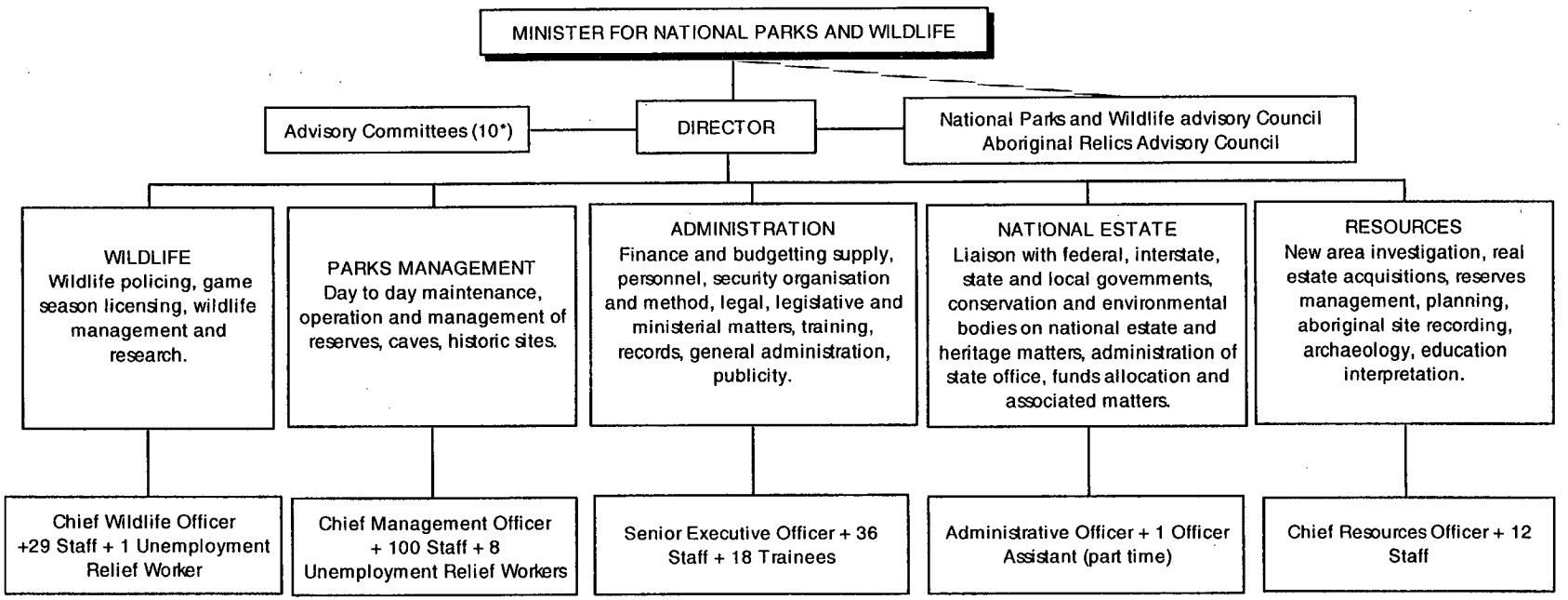
Chief Resources Officer
Investigation Staff
Planning Officers
Education & Interpretation Staff
Archaeologist
Total: 15 (12 +3 temp)

Chief Wildlife Officer
Research & Tech. Officer
Wildlife Rangers
Administrative staff
Total: 27 (21 + 6 temp)

Administration Division	34
Parks Management Division	98
Resources Division	15
Wildlife Division	27
Unemployment Relief	11
Trainees.....	14
Staff Establishment	199*

*In addition to the departmental establishment, the Service is responsible for Administrative/ Accounting functions relating to the National Estate Tasmania, (staff 2), and the South West Resources Survey (staff 5).

NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART AT 30TH JUNE 1980

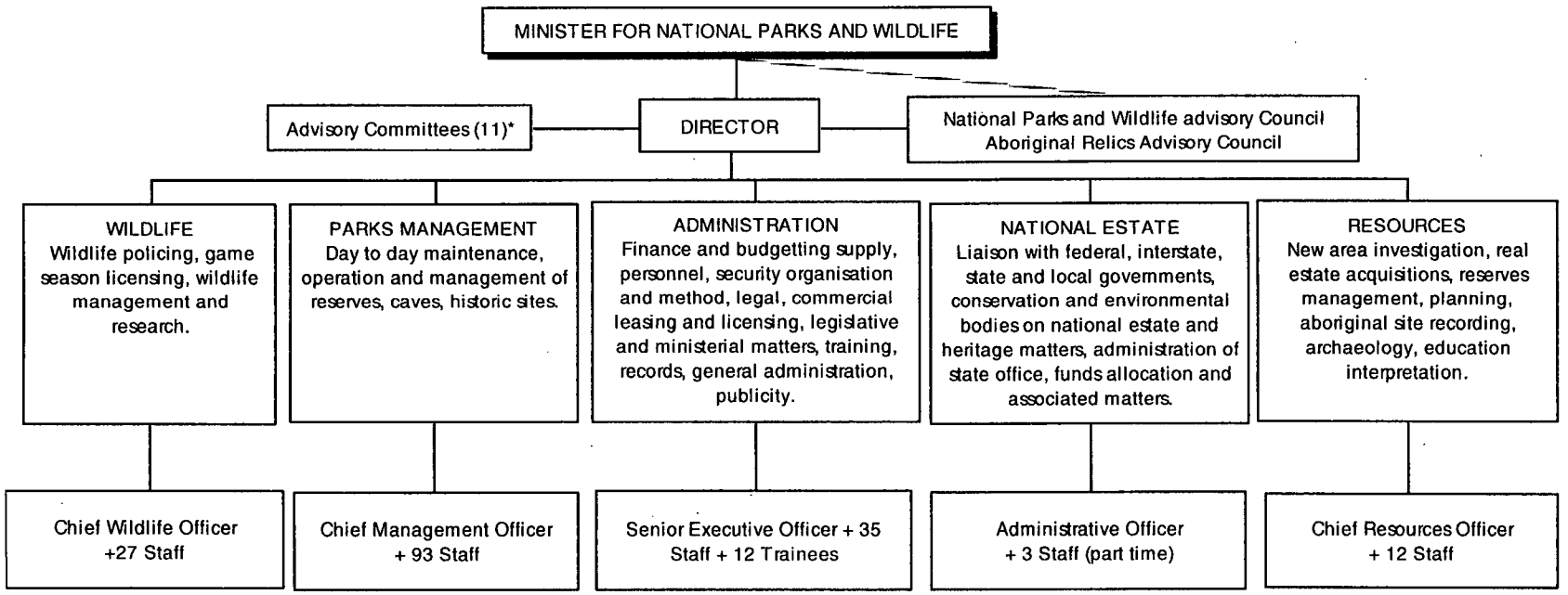


ANCILLIARY BODIES

The following ancilliary bodies have responsibilities to the Director:
South-West Tasmania Resources Survey, average staffing, team leader plus ten persons;
Port Arthur Conservation Project, proposed staffing, project manager plus ten persons.

*Details of these Committees are shown in the body of the Report.

NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART AT 30TH JUNE 1981



ANCILLIARY BODIES

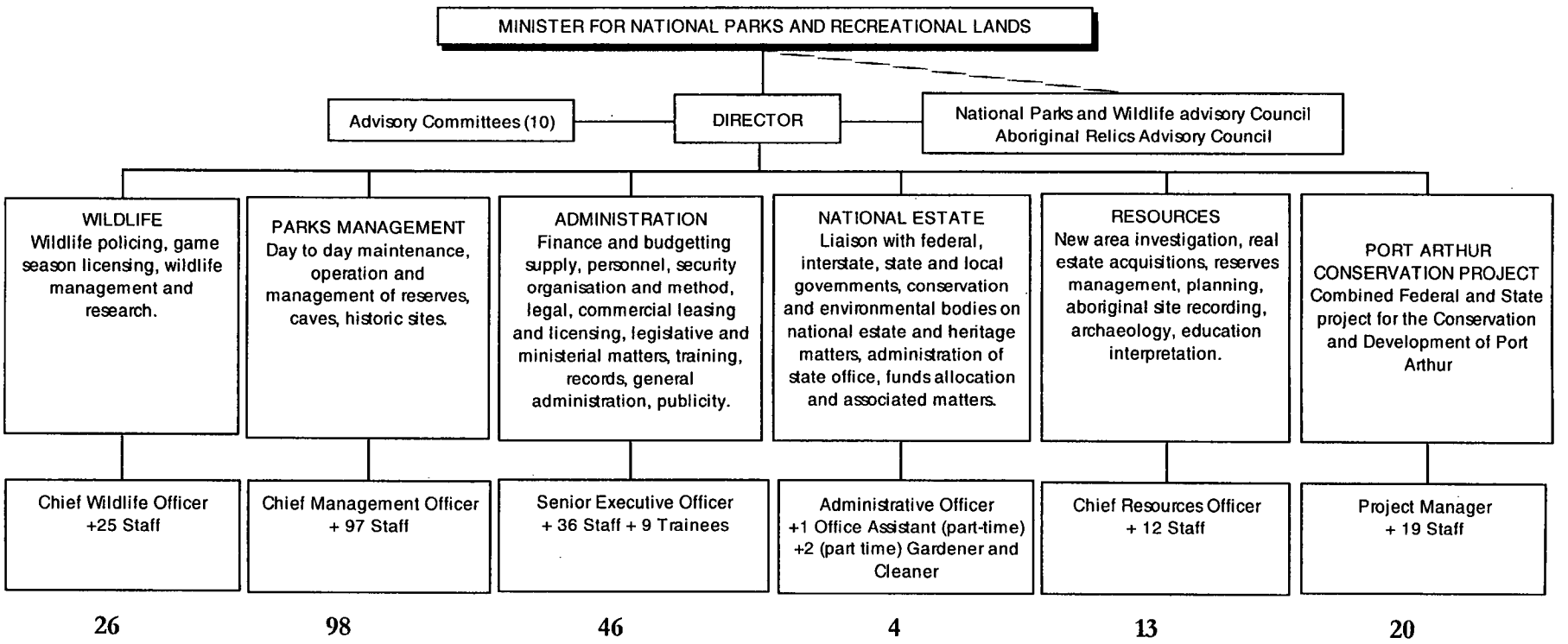
The following ancilliary bodies have responsibilities to the Director:

South-West Tasmania Resources Survey, average staffing, team leader plus ten persons;

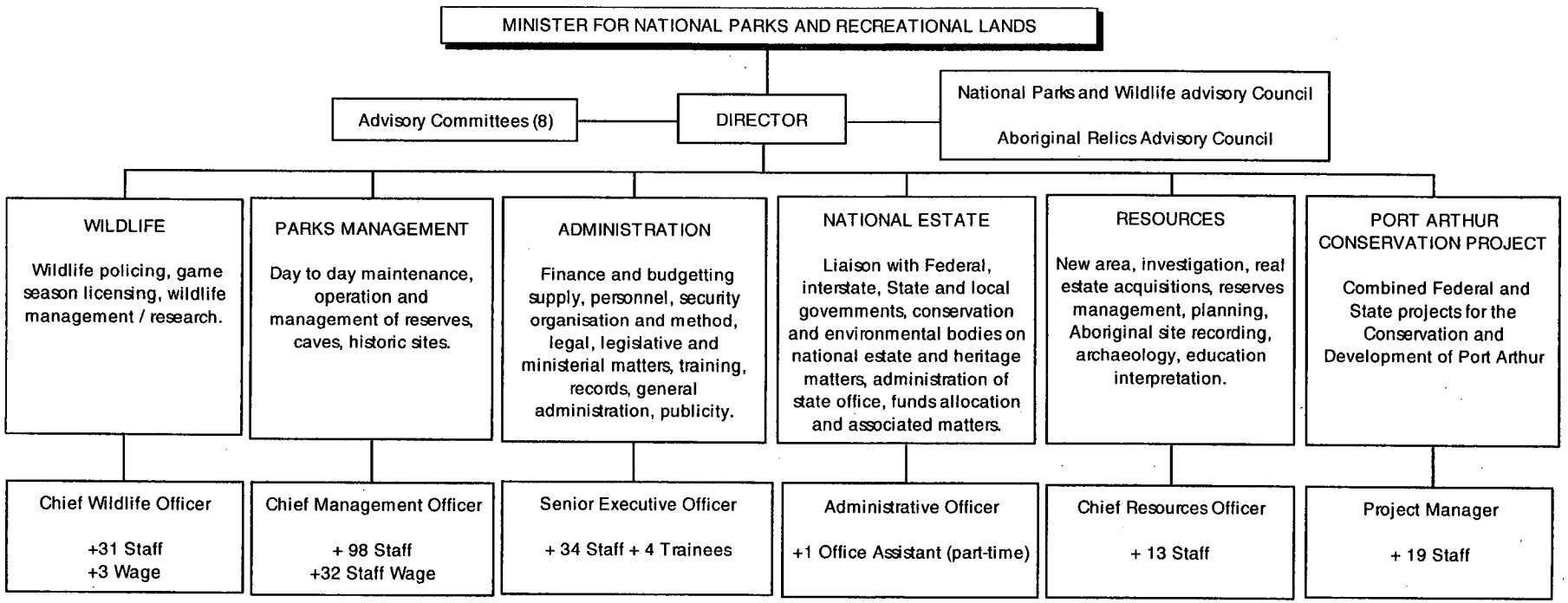
Port Arthur Conservation Project, proposed staffing, project manager plus twelve persons.

*Details of these Committees are shown in the body of the Report.

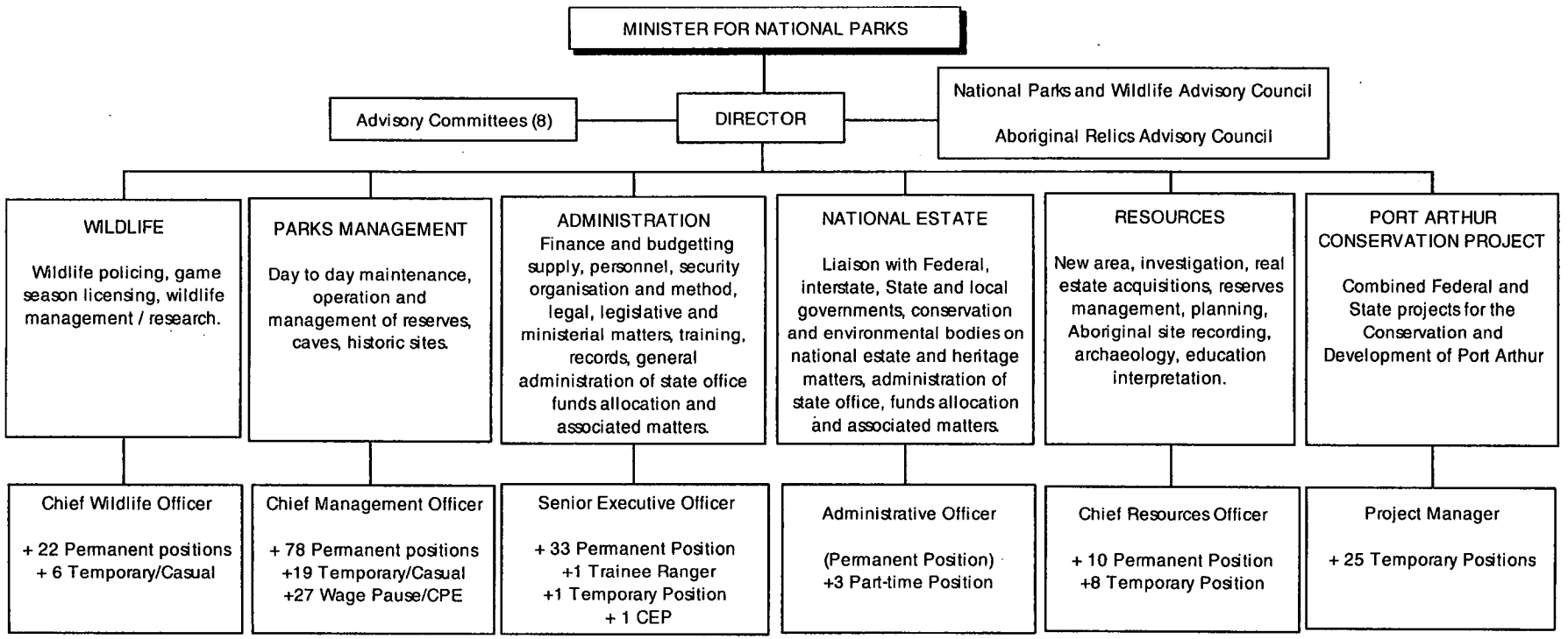
NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART AT 30TH JUNE 1982



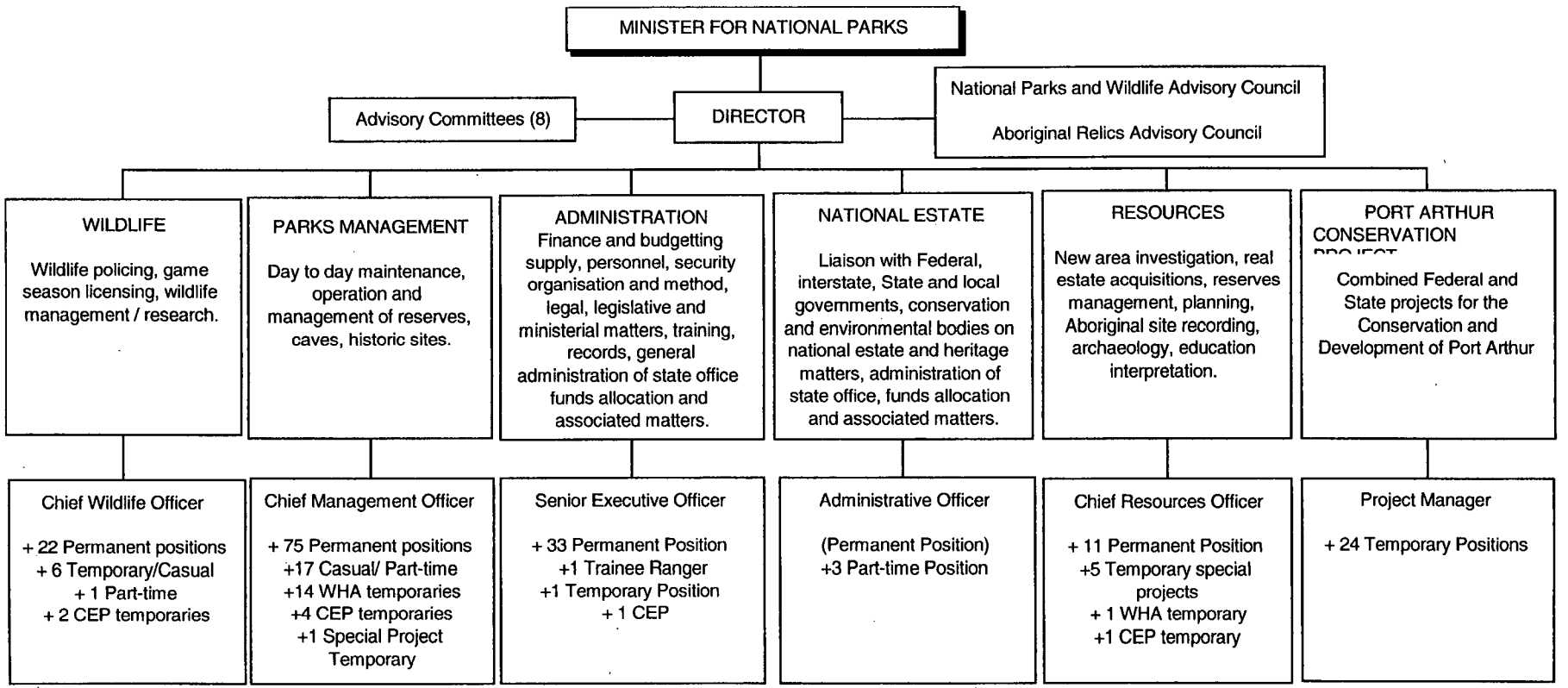
NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART AT 30TH JUNE 1983



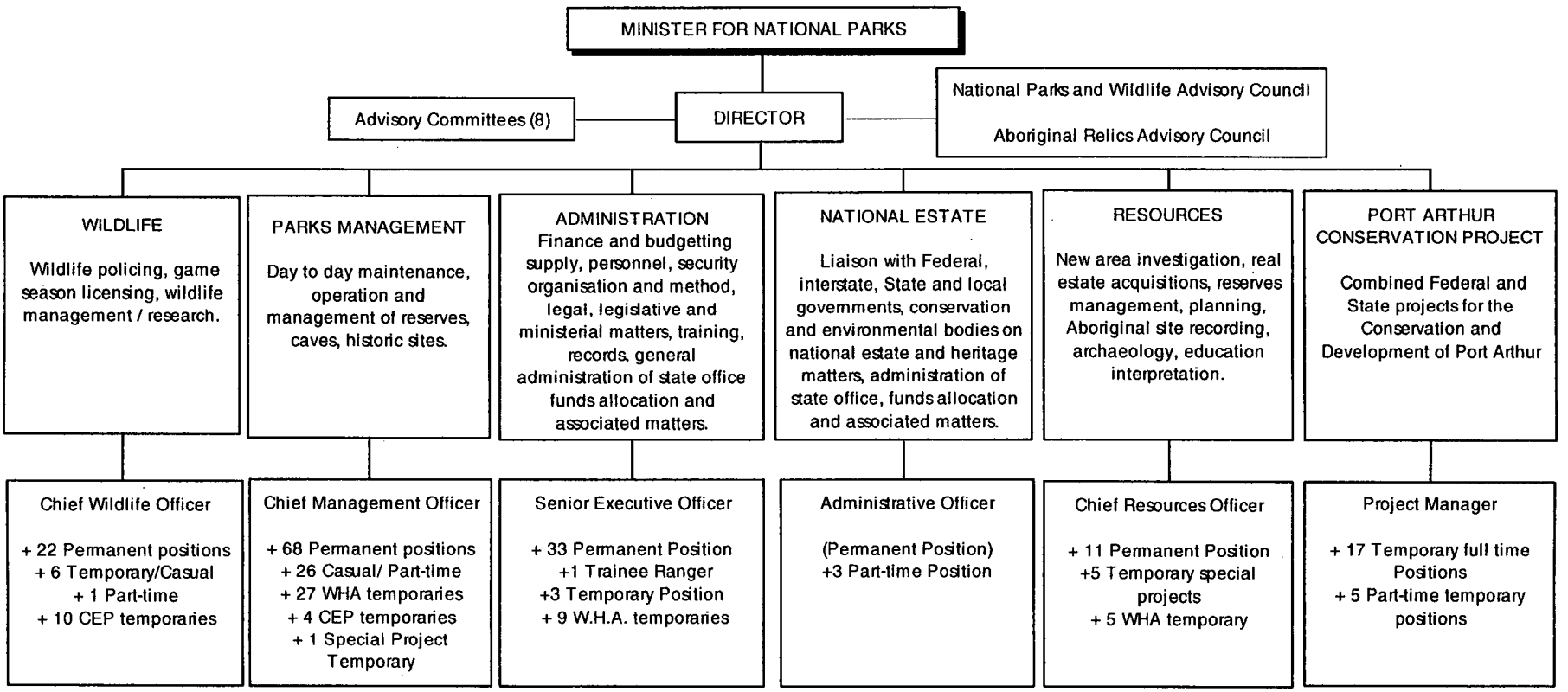
NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART AT 30TH JUNE 1984



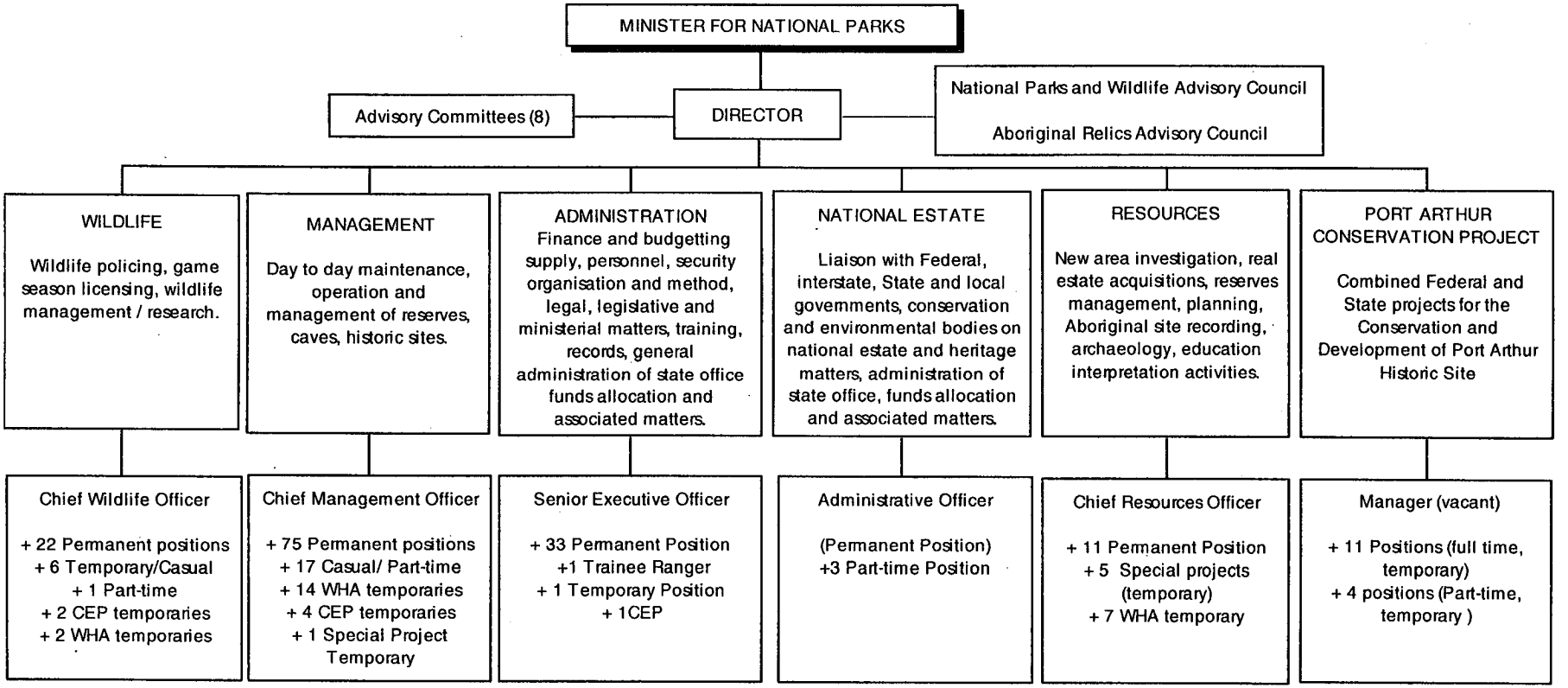
NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART AT 30TH JUNE 1985



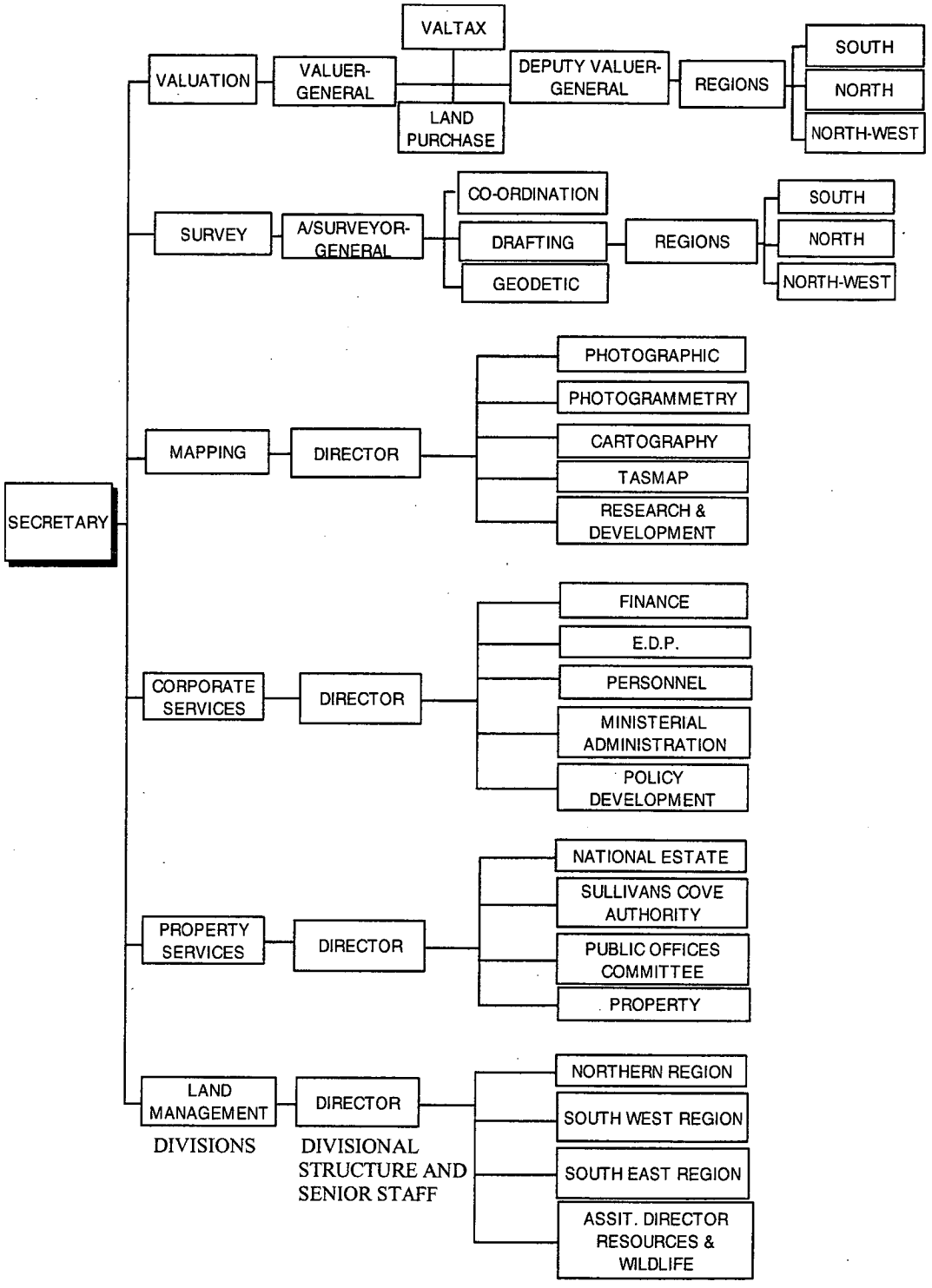
NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART AT 30TH JUNE 1986



NATIONAL PARKS & WILDLIFE SERVICE - ORGANISATION CHART AT 30TH APRIL 1987

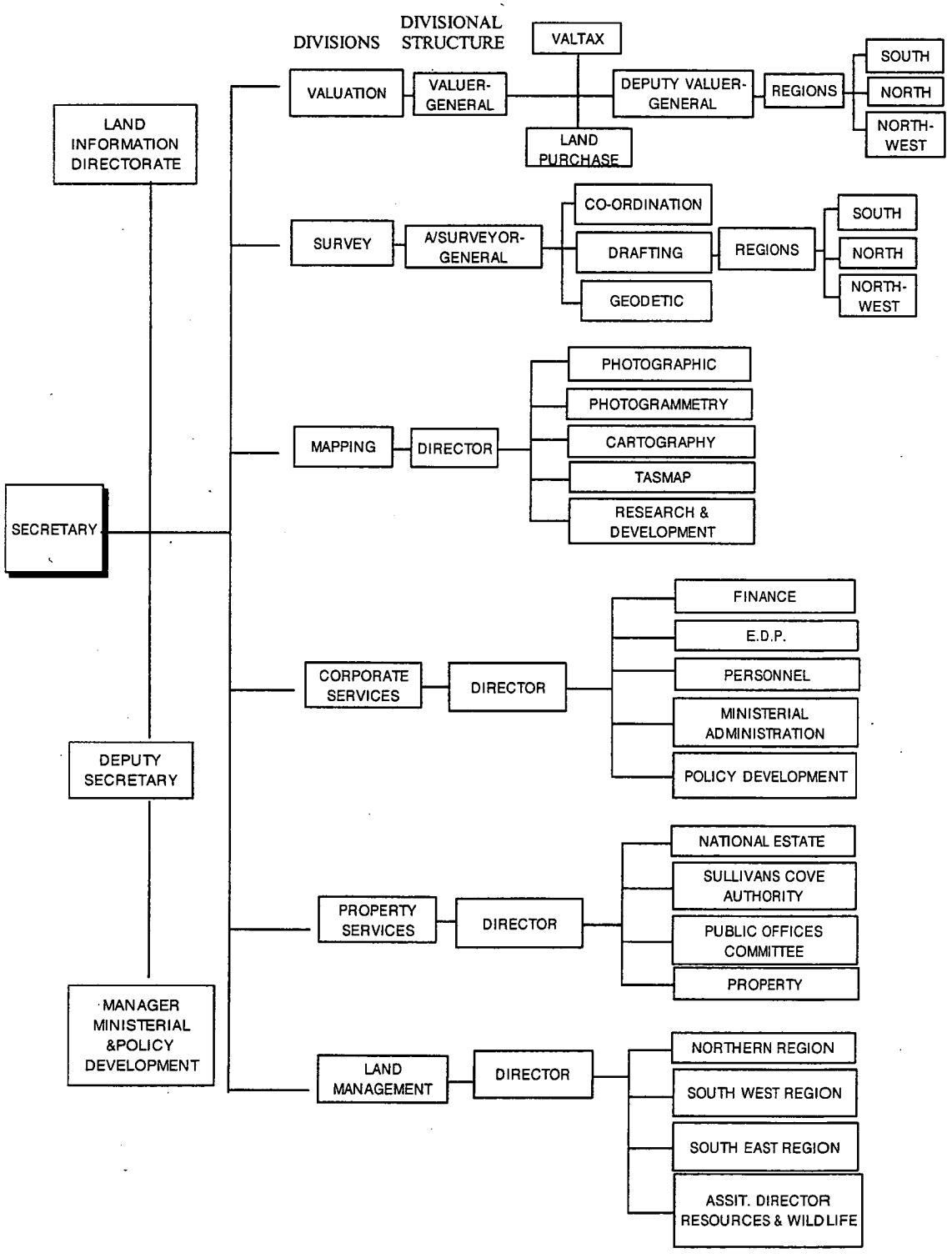


DEPARTMENT OF LANDS, PARKS & WILDLIFE
ORGANISATION CHART FOR THE YEAR 1987-88

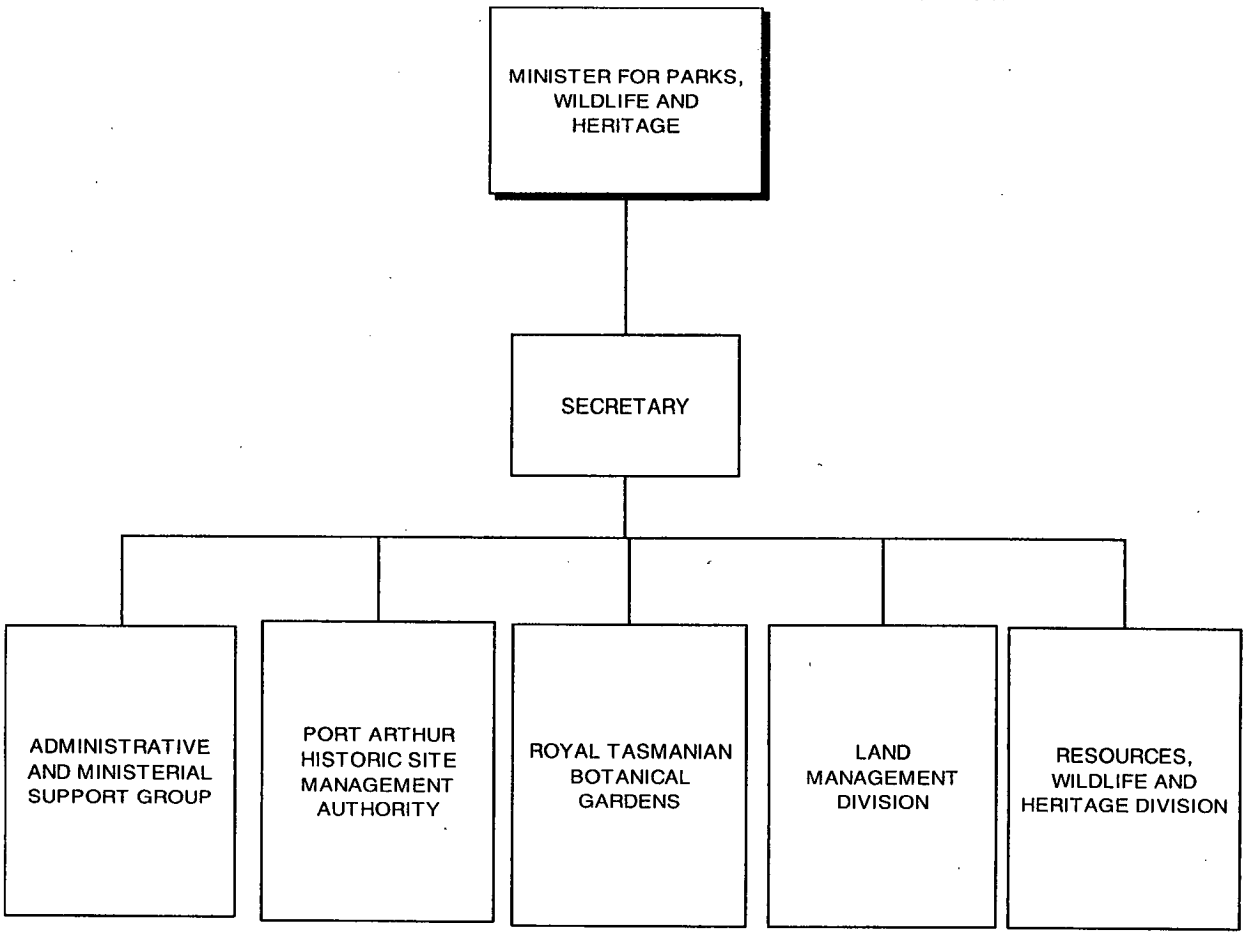


DEPARTMENT OF LANDS, PARKS & WILDLIFE
ORGANISATION CHART FOR THE YEAR 1988-89

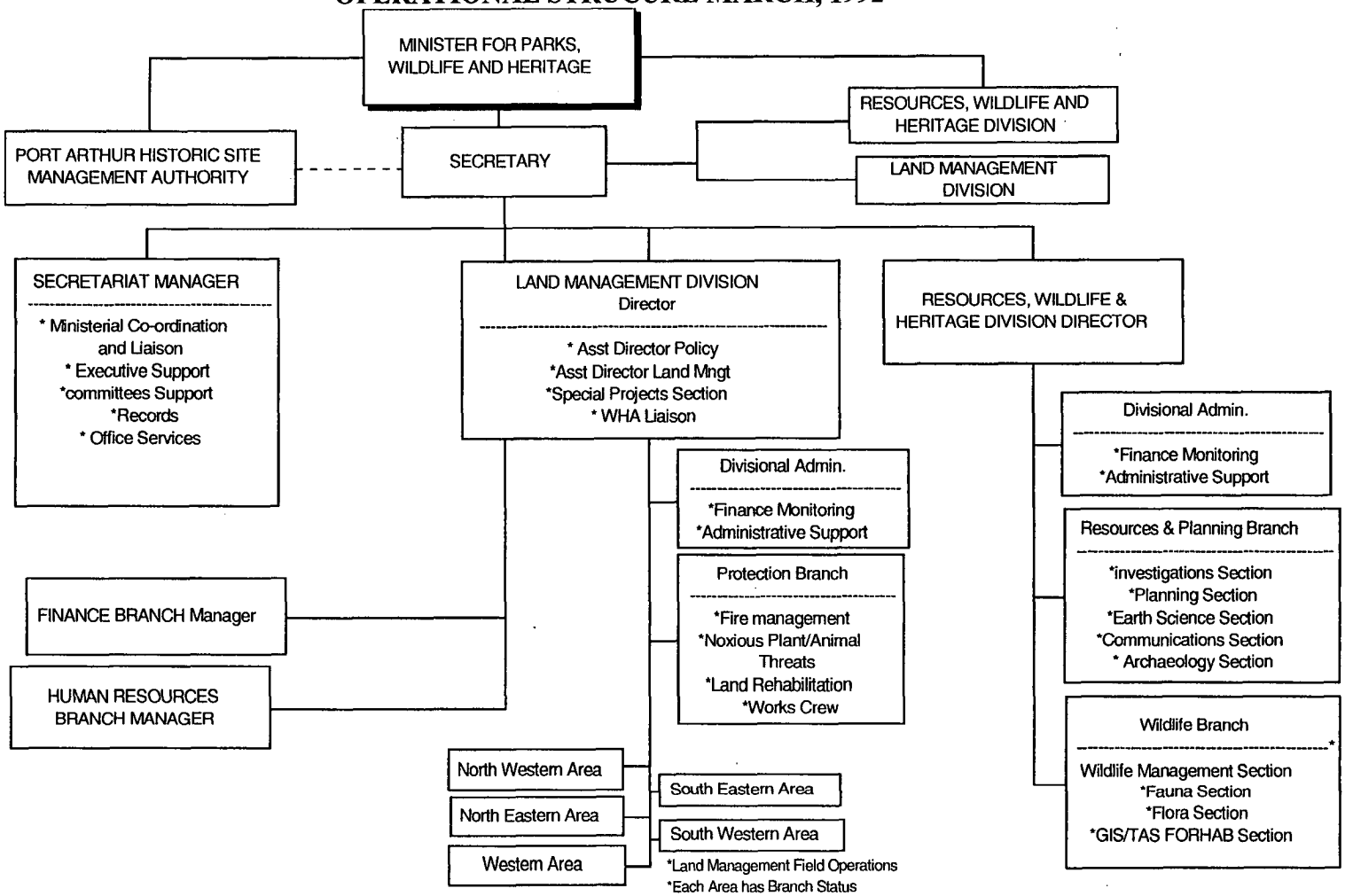
+ Statutory responsibilities as
  - Director-General of Lands
  - Director, National Parks and Wildlife



DEPARTMENT OF LANDS, PARKS & WILDLIFE
ORGANISATIONAL STRUCURE FOR THE YEAR 1990/91



DEPARTMENT OF PARKS, WILDLIFE AND HERITAGE
OPERATIONAL STRUCURE MARCH, 1992



DEPARTMENT OF ENVIRONMENT AND LAND MANAGEMENT

OPERATIONAL STRUCTURE, 1993

STRUCTURE	OUTCOME	PROGRAM 1993-94 BUDGET
Planning Division Environmental Management Division Policy Division	1. Sustainable Development	1. Sustainable Development
Land Information Bureau Office of Surveyor-General Office of Valuer-General	2. Land Information	2. Land Information Services
Land Title Office Office of Surveyor-General	3. Land title	
Tasmanian Property Services Group	4. Government Office	3. Crown Land and Asset Management, Wildlife and heritage 4. World Heritage Area (part of outcome 6)
Tasmanian Property Services Group	5. Crown Property Administration	
National Parks and Wildlife Service	6. Parks and Reserves	
National Parks and Wildlife Service Tasmanian Property Services Group	7. Natural and Cultural Heritage	
Local Government Office	8. Local Government	5. Local Government Services
Corporate Services Division Policy Division	9. Corporate and Government Services	6. Corporate and Government Services

*** Total of 4 Divisions, 4 Offices, 1 Bureau, 1 Group and 1 Service.**

DEPARTMENT OF ENVIRONMENT AND LAND MANAGEMENT

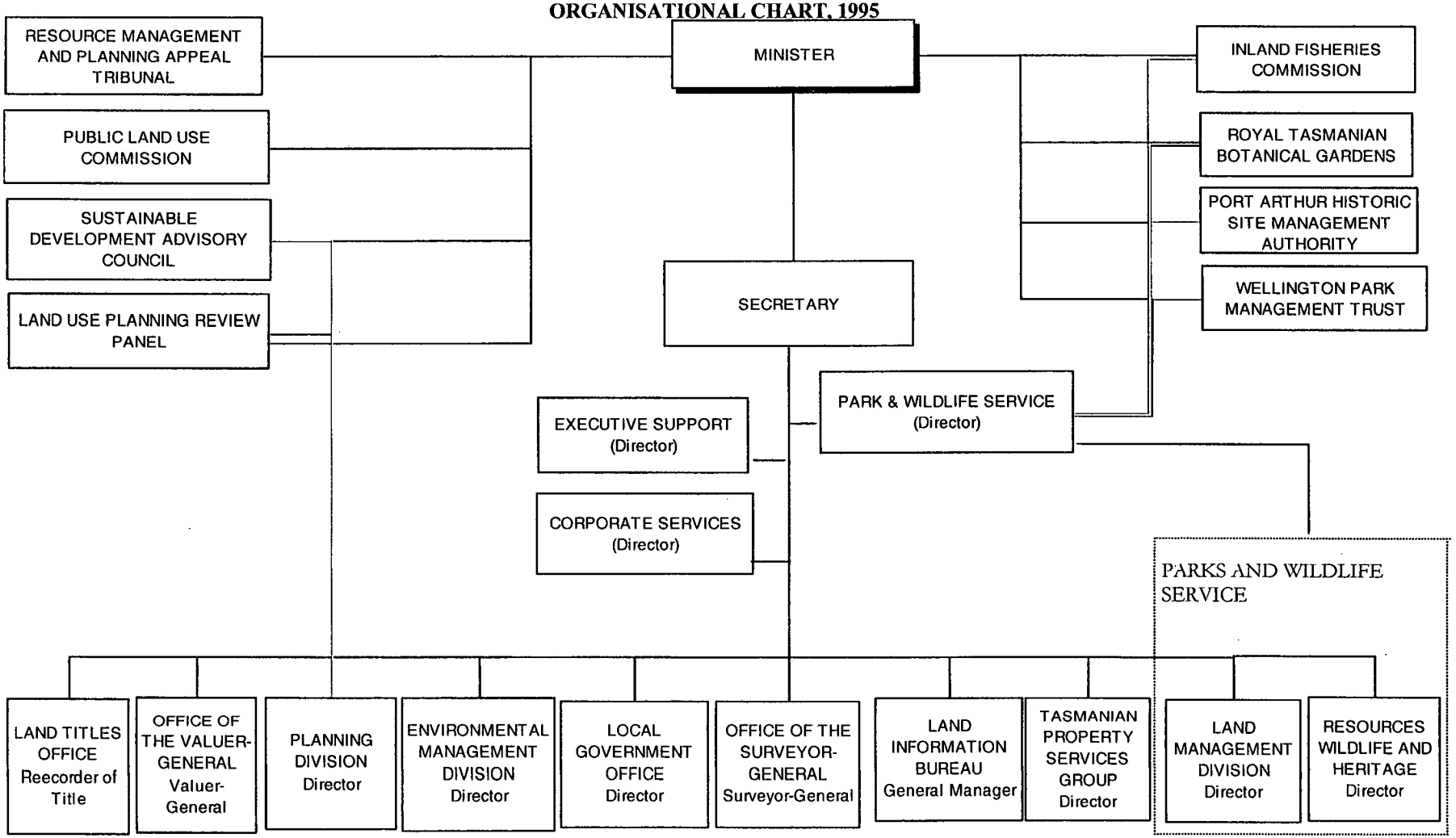
OPERATIONAL STRUCTURE, 1994

DIVISION	GOAL	BUDGET PROGRAM
Planning Division Environmental Management Division Policy Division	1. Sustainable Development	1. Sustainable Development PROGRAM
Land Information Bureau Office of Surveyor-General Office of Valuer-General	2. Land Information	2. Land Information Services
Land Title Office	3. Land title	
Tasmanian Property Services Group	4. Government Offices and Accommodation	3. Crown Land and Asset Management, Wildlife and Heritage
Tasmanian Property Services Group	5. Crown Property Administration	
National Parks and Wildlife Service	6. Parks, Wildlife and Heritage	4. World Heritage Area
Local Government Office	7. Local Government	5. Local Government Services
Corporate Services Division Policy Division	8. Corporate and Government Services	6. Corporate and Government Services

- Total of 4 Divisions, 4 Offices, 1 Bureau, 1 Group and 1 Service.

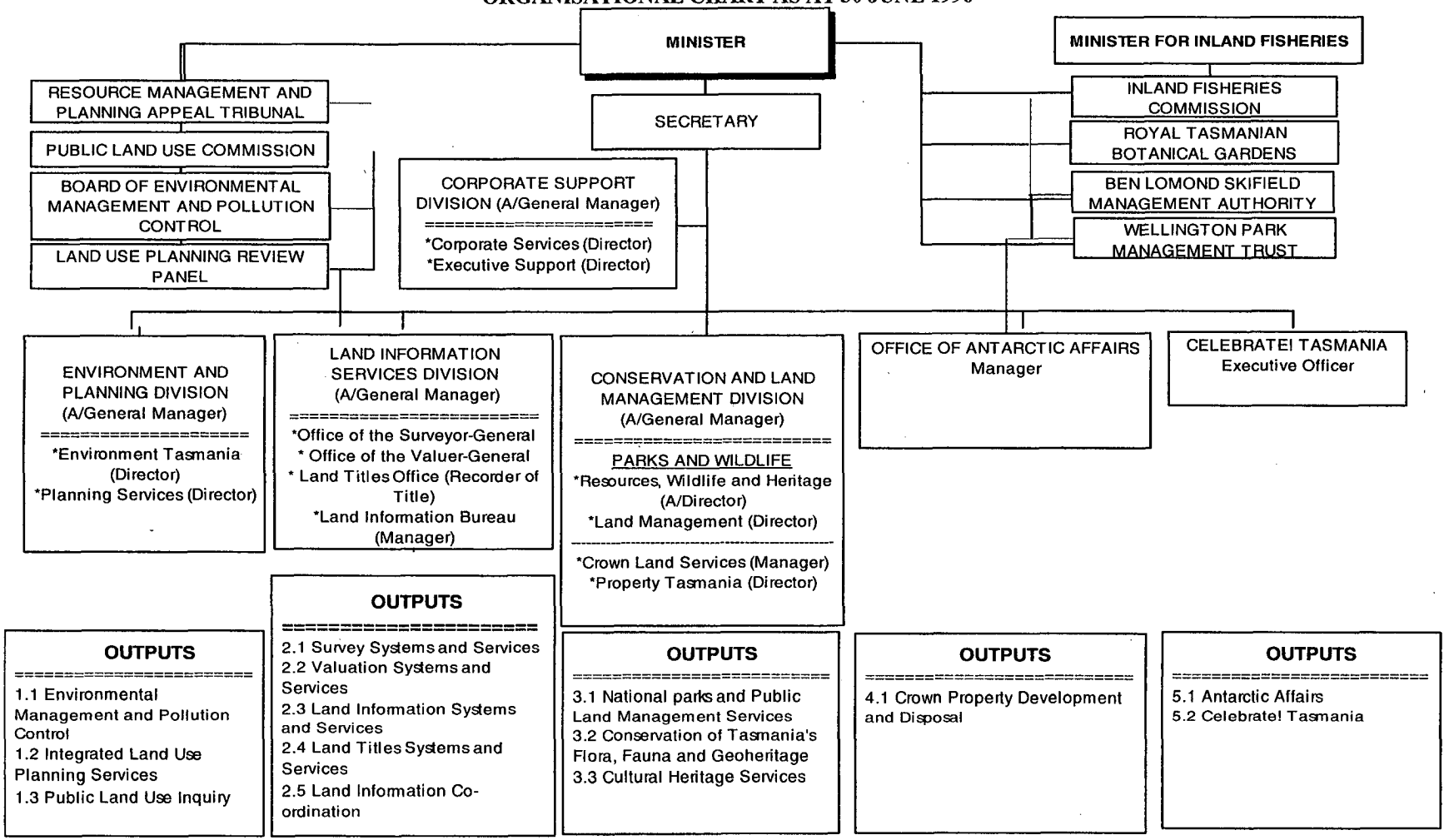
DEPARTMENT OF ENVIRONMENT AND LAND MANAGEMENT

ORGANISATIONAL CHART, 1995



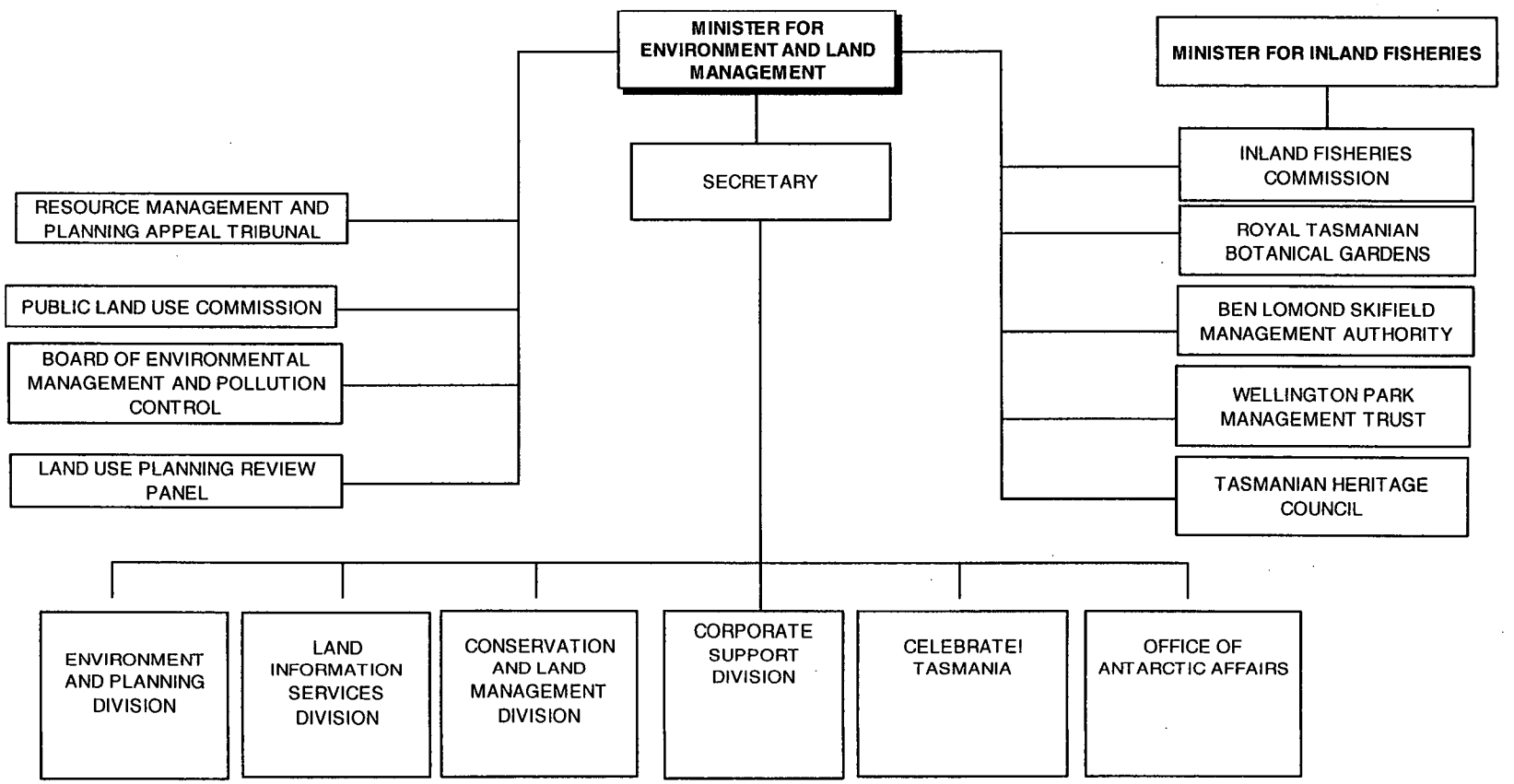
DEPARTMENT OF ENVIRONMENT AND LAND MANAGEMENT

ORGANISATIONAL CHART AS AT 30 JUNE 1996



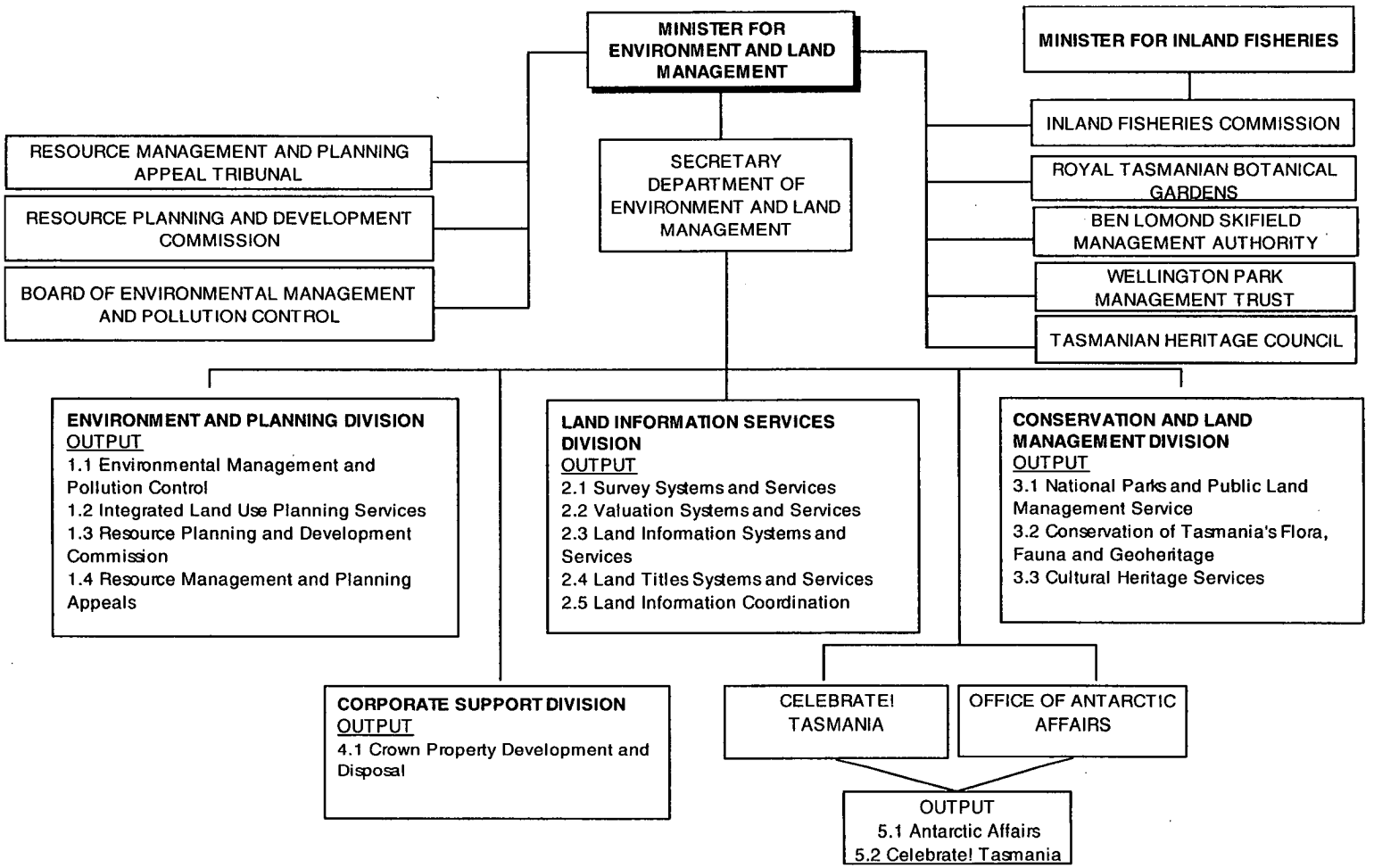
DEPARTMENT OF ENVIRONMENT AND LAND MANAGEMENT

ORGANISATIONAL CHART AS AT 30 JUNE 1997



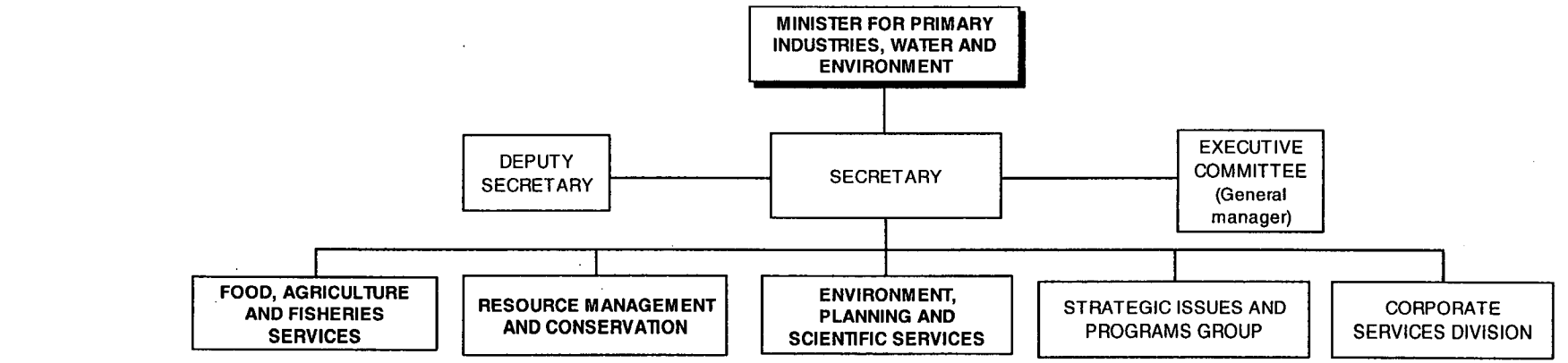
DEPARTMENT OF ENVIRONMENT AND LAND MANAGEMENT

ORGANISATIONAL CHART AS AT 30 JUNE 1998



DEPARTMENT OF PRIMARY INDUSTRIES, WATER AND ENVIRONMENT

ORGANISATIONAL CHART AS AT 30 JUNE 1999



INFORMATION AND LAND SERVICES
OUTPUT
1.1 Land Services and System
1.2 Information Systems ad Services
1.3 Government Valuation Services
1.4 Property Tasmania
1.5 Service Tasmania
*Output delivered by the Information and Land Services Division

FOOD, AGRICULTURE AND FISHERIES SERVICES
OUTPUT
2.1 Agriculture Industry Development Services
2.2 Quarantine, Plant and Animal Health Services
2.3 Marine Farming and Wild Fisheries Management
*Output delivered by the Food, Agriculture and Fisheries Division

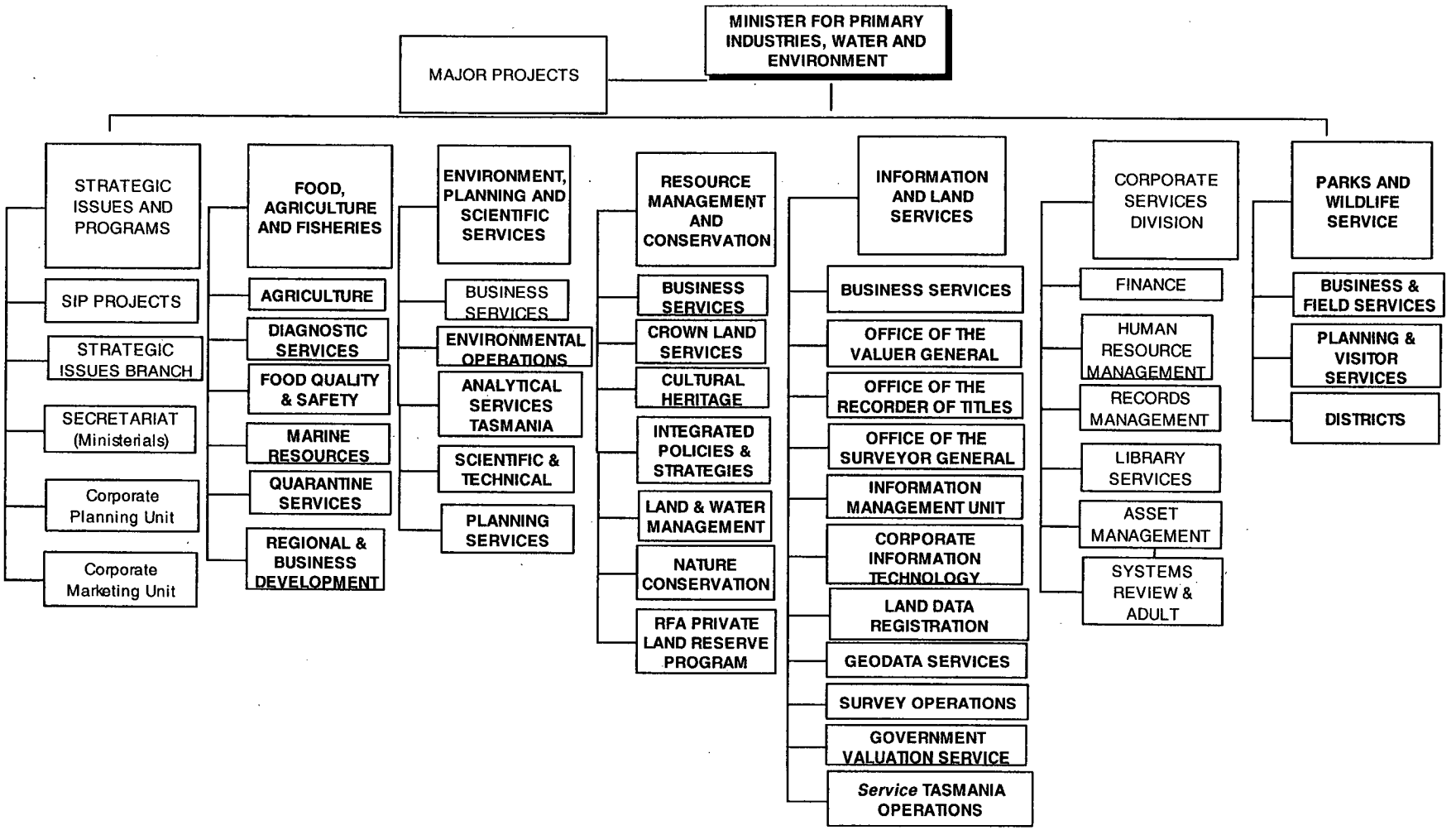
RESOURCE MANAGEMENT AND CONSERVATION
OUTPUT
3.1 National Parks and Public Land Management Service
3.2 Land, Water and Nature Conservation Services
3.3 Cultural Heritage Services
*Output delivered by the Resource Management and Conservation Division

ENVIRONMENT, PLANNING AND SCIENTIFIC SERVICES
OUTPUT
4.1 Environmental Management and Pollution Control
4.2 Integrated Land Use Planning Services
4.3 Analytical Services
4.4 Resource Planning and Development Commission
4.5 Resource Management and Planning Appeals
*Output 4.1, 4.2, 4.3 are delivered by the Environment, Planning and Scientific Services Division; Output 4.4 is delivered by the Resource Planning and Development Commission; and Output 4.5 is delivered by the Resource Management and Planning Appeal Tribunal

*The department is organised into five Divisions and a Strategic Issues and Programs Group.

DEPARTMENT OF PRIMARY INDUSTRIES, WATER AND ENVIRONMENT

ORGANISATIONAL CHART AS AT 30 JUNE 2000



APPENDIX B

Interview with Te-Shu Chan

Mr. Chan first worked at the Yang Ming Shan National Park (YMSNP) in 1988, his position at the time of interview was the chief of the Division of Conservation and Research since 1995. Management and research of the Ecological Reserves in the YMSNP are main responsibilities for his division.

In response to Q1, Mr. Chan replied that the impacts of introduced species inside the Ecological Reserves are not so serious but it is a big problem in other areas of the YMSNP. The most serious problem is abandoned animals, especially the feral dogs. In recent years, there are cases of abandoned animals such as Taiwanese monkey, Malaysian monkey and even orangutan, but the most populous feral animal is the dog. There is estimated to be about two hundred feral dogs in the YMSNP, and millions of them in Taiwan.

Responsibilities of feral dog control are shared by different agencies in Taiwan. The environmental protection agencies, such as the Environmental Protection Bureau in the Taipei City Government, have the responsibility for capturing feral

dogs. Treatment of captured feral dogs is the responsibility of domestic animal agencies, e.g. the Construction Bureau in the Taipei City Government. This feral dog issue has not just caused a lot of problems in the YMSNP but is a serious environmental problem for the whole of Taiwan.

From his point of view, the feral dogs cause hygiene and traffic hazards because their excrement and urine make the street filthy and they often seek food around dumps. As well, their activities could cause car accidents and they might spread human-animal transferable disease. Feral dogs also destroy the local small animal population by hunting them.

When it is causing obvious concern to the visitors and the local people in the YMSNP, the dog-capture team from the Environmental Protection Bureau in the Taipei City Government with assistance by the Division of Conservation and Research and the Park Cleaning and Maintenance Section, and the police in the YMSNP and local police branch, capture feral dogs. However the effort is not effective and elicits strong protests from animal rights groups and even overseas campaigners because of the inappropriate treatment of the captured feral dogs. This is a major feral animal problem in Taiwan.

In response to Q2, Mr. Chan replied that the work of environmental protection could not be done well by any individual governmental agency solely and it has to involve the general public. The YMSNP invites well-respected enterprises and Non-Government Organisations to fund and cooperate various campaign activities for environmental conservation. For example, a company might ask their employees to eliminate weeds in the National Park or grant financial aid toward the cost of weeding in some areas. An enterprise might donate fund to a large-scale revegetation project or provide their products as presents to attract more public participation in environmental activities.

In response to Q3, Mr. Chan replied that there are so many different governmental agencies to deal with conservation areas. The two major central governmental agencies are the conservation branch in the Council of Agriculture and the National Parks system under the Construction and Planning Administration. Other provincial government agencies, although the primary responsibility is not for conservation, are the National Scenic Area under the Tourism Bureau, the Forest Recreation Area under the Forestry Bureau and the Regional Scenic Area under the Travel Bureau. This is really a state of confusion for the managers and the public. Despite little effort of division of labor with individual responsibility, the conservation task can not be integrated causing a large problem. This dispersed responsibility creates management problems especially with the Environmental Protection Areas in Taiwan.

In the YMSNP, the Construction Bureau manages some dirt roads and the Engineering and Construction Bureau maintain the main sealed roads. The Education Bureau under the Taipei City Government manages a campsite and the Ministry of National Defence controls the military areas. This would not happen in the United States; they have a single management agency for all of the area in a National Park. There are a lot of problems in bringing full jurisdiction in the YMSNP; one of the issues is that the former management governmental agencies before the establishment of National Park do not intend to give up their control and the legislation does not support better, integrated management.

In response to Q4, Mr. Chan replied that apart from the National Park Act and the National Park Rules for Implementation, there are the Soil and Water Conservation Act and Forestry Act for natural resource management in Taiwan. National Parks have a more comprehensive management for conservation than other ecological protected areas because the National Parks have judicial police who can undertake law enforcement better than where there is not standing police force. Yet, the National Park Police normally have to use other legislation than National Park Act, since it is not a mandatory law. The National Park Act has to be revised and passed in order to be a mandatory law and be able to be effectively implemented in the future. For the time being, the Soil and Water

Conservation Act is employed to prosecute illegal site development and Forestry Act used to punish illegal forest operation.

In response to Q5, Mr. Chan replied that a cooperative effort for environmental conservation with other countries by Taiwan is restricted by international politics. Because the Chinese Government thwarts the Taiwanese Government from returning to the United Nations, the Government in Taiwan is not an eligible signatory of any international treaty and cannot join international bodies such as IUCN. Despite this difficulty, Taiwan has vigorously promoted international conservation cooperation. Taiwanese government officials cannot attend various international congresses but the Non-government Agencies and individuals are actively involved in these as observers. Although the Government in Taiwan is not part of any inter-government treaty, it still follows the standards set by the international agreements and positively contributes to international conservation cooperation. It is deeply hoped that the international inter-government bodies could bypass political stances for a better conservation cooperation internationally.

In response to Q6, Mr. Chan replied that environmental pollution is not a serious problem in the YMSNP. Major garbage disposal is the responsibility of the Taipei City and County Government, and the walking track rubbish is contracted

to a private contractor by the YMSNP. The YMSNP has had built and operated an incinerator for garbage treatment, it can treat eight tons of solid waste per day. There are residential areas inside the YMSNP, yet there is no hospital or factory, thus the toxic waste impact is minimal and the air and sound pollution is hardly a issue in the YMSNP.

In response to Q7, Mr. Chan replied that the responsibility of environmental education is mostly with the Interpretation and Education Division in the YMSNP. Nevertheless the Conservation Research Division is gradually sharing the promotion work for environmental education through organising natural conservation training courses, conferences and natural resource understanding forums. As a first step, primary and secondary school teachers will be trained as seed teachers to spread the message of conservation, in order to reach a larger population with environmental education.

The Division of Conservation and Research in the YMSNP entrusts the planning of the first teacher training program to a Non-Government Organisations, the Association of Environmental Education of the Republic of China. There are environmental education activity series, overnight camp, run by the Construction and Planning Administration. Different National Parks also organise and

promote educational activity called A Date with the National Park which try to incorporate education component with recreation activities.

Environmental education is very important because it enables the general public to change their environmental concepts and attitudes toward the environment. This has to start with promoting environmental education to all. Some of the general public might want to act in environmental friendly ways but do not know how to, thus the providing what and how information of environmental conservation is the first step. Only by way of enhancing environmental education and changing the conception of the general public about the environment can environmental protection be accomplished. Otherwise only having severe laws and punishing offenders might cause just the contrary.

In response to Q8, Mr. Chan replied that the rise of the consciousness of the need for environmental protection has engendered the flourishing of many new Non-Government Organisations which want to protect and improve the environment. He quoted the words from the Taipei City mayor, Mr. Chen, that "the ability and the financial resources of the government are limited, but the resource from the public is limitless". If enterprises could allocate part of their profit to support the environmental protection cause, this would be the best way to feedback to the society. The government also needs to support the environmental protection

agencies and assist Non-Government Organisations to work together for better improvement in conservation.

In response to Q9, Mr. Chan replied that to implement conservation undertakings needs to be very thorough. The government has to implement environmental protection with daring and resolution, and not compromise with the pressure from the opposition which are normally the pollution producing enterprises. The government should not divorce itself from the masses and from reality and act blindly. Although different nations have their own conditions and it may not be possible to adopt their practice, it would be beneficial to draw lessons from their practice. Thus, the government should provide the opportunity for international experience exchange.

Interview with Chau-Jen Chen

Mr. Chen was an administrative officer in the Resources Conservation Division of the Forestry Department, the Council of Agriculture when he was interviewed. He had worked in the conservation field for eight years and his main responsibilities were coordinating conservation operations, liaising with different levels of Governments and promoting environmental education in Taiwan.

In response to Q1, Mr. Chen replied that introduced species have always been an ongoing problem. When there was seriously damage done to agriculture by pests, the government drew up a special pest control budget to tackle the problem but there are no specific policies to deal with other non-agriculture-related problems.

The Wildlife Conservation Act prohibits anyone to free captive animals, including domestic and introduced animals, to the wild. There are controls on animal trade, but with the international export and import business and the convenience of global traffic, it is very difficult to take precautions against illegal trade which makes introduced species issues more complicated to resolve.

The best solution would be to engender in the general public a common concern about introduced species issues through education, whilst preventing the introduction of any inappropriate species.

In response to Q2, Mr. Chen replied that they are gradually getting more expressions of concern about environmental issues from the public and non-government organisations. It is essential for success that conservation be workable for the local community. There are a few successful examples in Taiwan, which demonstrate wildlife conservation is possible for local people in their neighbourhood.

For instance, some Aboriginal tribes are gradually forming spontaneous bodies which are involved in resource management work around their land; and local organisations in southern and eastern Taiwan are being established to conserve fish resources in the river system near their residential areas.

The Council of Agriculture is pleased that the involvement in conservation by the general public is steadily growing. The public does not necessarily need governmental grants but even donate their own money and time for their conservation work.

At present, the Taiwanese Government stresses the concept of 'small but also excellent' and, if the task could be achieved by the general public, then the government would let the non-government organisations alone complete it. Otherwise the government would assist the public to promote such work. There are different funding sources for establishing a non-government organisation.

One is to use a governmental grant to operate. Due to the lack of administrative staff in the government, especially the conservation agencies, empowering non-government organisations to use their own manpower is the more practical and easier way to realise the goals of conservation. The other option is to set up a foundation to seek donations from the private sector and the public.

Actually a lot of tasks only need an enthusiastic group to accomplish their target, especially conservation work, and do not necessarily require a lot of funding. Overt structures may not be required but people are needed to run conservation works. Many individuals spontaneously give their contributions and more and more non-government organisations are willing to be involved voluntarily.

It is possible that in the future this situation will be like the United Kingdom and Australia where non-government organisations are vigorously involved. When the workload of the government gradually passes on to non-government organisations through reaching the stage of the general public being involved in conservation by their own initiatives, then real success in conservation becomes possible.

Ten years ago, the promotion of environmental work was started by the Central Governmental through the Council of Agriculture. This promotion gradually

passed on to the county governments, then to the local communities. At that time the government worked with several non-government organisations to promote conservation activities. The public has enthusiasm though not experience, but after helping and supporting each other the strength builds up and finally the non-government organisations have the ability to do conservation work independently.

The government has to set an example to let the people follow. On the other hand if there is the talent in the non-government sector to figure out better policies or solutions than the government, then the government should let the non-government organisations lead the way and cooperate with them.

In response to Q3, Mr. Chen replied that there has not been a single standard for every governmental structure. The present structure is formed according to the tendency of the times and the background of the society and there is no single structure that is right or wrong. The existing governmental structure fits with the present phase in the society. If it needs to be changed then the transforming stage has to be carefully considered. The structure of each stage has to fulfil the demands of the community.

At the present in Taiwan, the Construction and Planning Administration guide the conservation work inside the National Parks and the Council of Agriculture and other governmental agencies share the responsibilities outside National

Parks. Although there are discussions about integrating this dispersed situation, and various models from other countries, such as the United States and Japan are being considered, yet it is still not resolved. From a long-range prospect, conservation-related administration should be integrated but this involves a wide range of problems.

The replanning of the government's conservation structure depends on the operation of the national administrative system, and other resource regimes of management including agriculture, forestry, fisheries, animal husbandry, and even industries and national defence. It is difficult for a single agency to manage so many different areas in Taiwan. In future, the government might put similar issues into an agency rather than merging to one cover-all agency.

In response to Q4, Mr. Chen replied that legislation has to be revised along with public feelings and the demands of society. The original objective of a particular piece of legislation at the outset will change with the lapse of time. The adjustment of existing legislation will be made in the wake of modification of the wider political and economic environment or agreement between different governmental agencies.

Although the present Wildlife Conservation Act in Taiwan mainly regulates issues to do with wildlife, it is also involved with forestry and land issues. Therefore, when the issue specially links with wildlife, the special legislation is

the Wildlife Conservation Act. This Act was drafted by the Council of Agriculture and passed by the Legislative Council but does not have input from the public, because the members of the Legislative Council are already the representatives of the people.

When conflict between the different laws occurs and the legislation becomes difficult to enforce, it is time to amend. When modifying legislation, the related governmental agencies will send their representatives with their opinions and concerns to negotiate in order to avoid any conflict of laws and agree on acceptable terms and conditions.

Upon designation of a Wildlife Protection Area, when necessary, the government holds a public hearing and the opinions of the public become part of the basic information for delimiting the protection area. After proclamation of a Wildlife Protection Area, the local people can voice their objection to the administrative agency and ask for modification. It is the right of the local community to voice their views and protect their businesses.

Legislation is the foundation of implementing conservation. It is necessary to propagate intentions and details of legislation, especially those closely related to the people's livelihood. Some legislation does require part of the community to change their present practices and that causes resistance. In this situation, the

government has to convince the affected population that their sacrifice will have a positive benefit for the greater part of the community.

Once people accept that conservation is the trend and for the public good, hopefully they will compromise. This is an issue of conflict of interest, therefore it needs more effort to reduce conflict and it needs a lot of time for communication.

In response to Q5, Mr. Chen replied that the international organisations do not accept Taiwan as a member. It is not because Taiwan wishes not to join intergovernmental organisations but that the factor of international politics means that Taiwan is not an international treaty assigned nation.

The only way for Taiwan to be involved in international environmental organisations is by informally sending representatives from non-government organisations as observers to international congresses, but the voice of Taiwan is hardly heard. If the international society could accept Taiwan as a member of their intergovernmental organisations, the political consideration over the environmental conservation would no longer be an issue.

Despite the difficult situation, Taiwan is establishing standards set by international environmental treaties and is willing to be involved in global issues to promote conservation. The Taiwanese government and the non-government

sectors are closely watching the progress of the international environmental agreements and exchange related information with other countries.

There have already been a few international cooperation projects on conservation between Taiwan and other nations in progress informally, and Taiwan eagerly wants to be involved formally in the future.

In response to Q6, Mr. Chen replied that there should be no pollution inside environmental protected areas and natural reserves, but in reality some areas located in or near urban zones are heavily polluted. For instance, the Hua-jiang Bridge Waterbird Protection Area in Taipei is situated in the middle of the city and the water is seriously polluted by domestic and industrial sewage.

The most important thing is to educate the public to reduce pollutants, and the governmental administrative agency has to monitor and treat pollution for better management. Furthermore, a more comprehensive sewer system and updated sewage treatment are vital for improving water pollution in the metropolitan areas.

In response to Q7, Mr. Chen replied that the willingness and the knowledge of conservation by the public are the most important outcomes in environmental education. The targets of conservation promotion are broad, including the general

public and the school systems. The Council of Agriculture promotes conservation awareness in accordance with specific objectives every year.

In recent years, the school system has appeared very important to the Council of Agriculture and the Council cooperates with schools for several educational projects. Students will affect their parents and friends. Thus through the school system, environmental education should get good results for half the effort.

As for public promotion, the Council of Agriculture utilises electronic and paper media for environmental education. The difference between conservation and economic development is that economic development has the instant benefit of money measurement but conservation does not have a visible money value attached. The public has to be informed that conservation is a long-term benefit and it is not necessarily to oppose economic development but to reach a balance between conservation and economic development.

Conservation is a matter of compromise in order to get the most benefit for all people. This needs the public to discuss environmental issues as much as possible. Many conflicts would be reduced if everybody considered the standpoints of most people. The purpose of promoting environmental education is to let the public realise the true essence of conservation and the importance of a diversity of animals and plants.

He emphasised the importance of cooperation with international conservation, such as educating people not to purchase products made from endangered species. According to different regulations in different nations, people who bought illegal goods could be punished if the purchased item is prohibited to trade.

Environmental education should include theory and practice. On one hand, underline how to respect nature, talk to people about relationships between animals, plants, environment and human beings; on the other hand, point out how to behave in the natural environment and how to interact properly with wildlife.

Hence environmental education is best illustrated with everyday life examples, such as how to develop land to avoid conflict with conservation. The purposes of economic development and conservation are to bring benefits to the people. These are not necessarily in conflict.

In response to Q8, Mr. Chen replied that governmental agencies have their own budgets that cannot be accurately predicted because they depend on administrative operations each year. Therefore the funding sources from government are not reliable. Overall, the resources for the involvement of non-government organisations in conservation will grow gradually.

The non-government organisations have to consider how they spend money at every step and not rely on funding from government. They should have strategies and outcomes to attract public support and funding from enterprise or government.

In response to Q9, Mr. Chen replied that Taiwan longs for international conservation cooperation and formal communication with other countries. There was a good example of sharing experience when the Australian and New Zealand whale experts were invited by a private institution to share their knowledge about whale stranding and rescue.

Although the Taiwanese government cannot be a treaty-participating government, it has full willingness for international exchange and promotion of conservation. There is no national boundary for international conservation, any extinction of a species is bad for all human beings. It is thus necessary to have experience exchange.

Interview with Peter Grant

Peter Grant was an interpretation officer at the time of interviewing, involved in programs with education and interpretation signs, posters, brochures, displays, publications and face to face educational programs. He has been doing this for about six years and has a background in teaching.

In response to Q1, he replied that part of interpretation is gathering information from those who have experience and trying to impart that knowledge to the general public. A couple of examples of local situations are a seaweed which is believed to have been introduced from ballast water from overseas.

The Japanese sea star is another local problem. He thinks there are a lot of other problems both on land and sea. Australia has huge problems with rabbits which cause serious imbalance in the ecosystem.

Peter Grant thinks that probably one of the major problems in Australia is the lack of knowledge of Australian native ecosystems. It was only recently discovered, for example, that the hand-fish lives in the Derwent Estuary. The NPWS found out about it and it is almost extinct because of the sea stars and other species. It is a fish that lives on the bottom and its fins are hand-like and it crawls along under the water. The NPWS know very little about it. Often the NPWS do not know about the whole life cycle of these individual creatures or of

the ecosystem as a whole and so the need for fundamental research on how ecosystems work is going to be very important to prevent the loss of endangered species.

Often it is harder to get researchers interested in things like how a worm reproduces and the whole life cycle of a fish, because it is time consuming and requires painstaking research, but it is essential.

In response to Q2, Peter Grant replied that the NPWS are responsible for whole catchment management, looking at everything from the soil and streams and the land surface, vegetation cover, right down to the estuaries and beyond into the ocean.

Sometimes the NPWS focus on individual problems a little too closely and do not consider the broader picture of how the whole land works. In some of the National Parks, for example Maria Island National Park, the whole of the island is a National Park and the NPWS can manage it as a whole unit and take most things into account.

In many of the Tasmanian National Parks, the NPWS may have highland country and may be concerned about things that happen there but have little control of the parts that are outside the jurisdiction of the NPWS, such as forestry land, and

privately owned land. It is hard for the NPWS to take an approach which takes everything into account.

The NPWS obviously need to work with other agencies and with landowners to achieve what the NPWS call 'off-reserve conservation' which is becoming very important for the department. The NPWS do not and cannot control the whole of the ecosystem and education is going to be very important among landholders to help them work out ways to preserve the soil and keep the water quality up to save species.

One example is a fresh water crayfish which lives in northern Tasmania, mostly in waterways on private land. Part of the NPWS's role is both doing the research to understand how it lives and also providing education to alert land holders to the fact that there are certain things they can do that will help these crayfish. Conversely there are other things they do that will harm the crayfish.

The interviewer mentioned that the other example is the platypus found in the waterways of private properties. Peter Grant agreed and commented that the NPWS cannot say 'that is OK, we keep platypus safe in National Parks', because most of the platypus are not in the National Parks'. He thinks it is important that the NPWS have a brief that includes the whole of the natural world.

In response to Q3, Peter Grant replied that he thought there were advantages and disadvantages with natural resource management being centralised. One of the advantages is that the NPWS do get to see the big picture and they do have some power although they do not have control over all the land that have interests in. The NPWS have a lot of power over the land that the department is managing, which gives the department influence over the land that the department is not managing.

One of the disadvantages is that you tend to breed an 'us' and 'them' mentality and that the NPWS become the heroes and some farmers and some foresters become the villains. Whilst what is needed is actually work alongside farmers, foresters and the landholders and say that what is best for the environment is often best for the economy too.

In response to Q4, Peter Grant replied that he thinks there are holes in all legislation. For example, snakes are not protected or reptiles are not protected outside of reserves and National Parks. So it is legal for people to just kill a snake if they want to, if it is on their land.

A better system would be for that species to be protected except where a permit is granted, which is how it works with other protected species. Take the Tasmanian devil, for example. It can be a nuisance, attacking poultry and other

small stock. They are protected so you do not shoot and then ask questions later, they must be left alone and then the issue dealt with.

Whilst people kill some species like snakes, it is important to understand their ecosystem and how it interacts with other activities and do the best to minimise areas of conflict. Other areas he thinks are weak include the Tasmanian pollution laws. They may seem strong but they are not really enforced so companies that pollute too often get away with it. They are warned but some companies just see fines as a tax. It is a small tax that they pay to be able to pollute and that is wrong.

Sewage systems pollute the water without councils or government really paying for it. Although there is some success with law enforcement some people get away with breaking the law, as in shooting seals. Marine farmers might shoot seals and get away with a caution or might illegally shoot wallaby and in their first offence they are quite likely to get off. If the law is followed through and implemented, it probably would not be too bad, but there are loopholes.

In response to Q5, Peter Grant replied that there are informal things like exchanges with New Zealand National Parks and also international agreements such as the Ramsar Treaty which is to do with wetlands and to which Australia is a signatory. A number of reserves around Tasmania are called Ramsar reserves and exist mainly to protect water birds.

Tasmania is also involved in an international ballast water treaty which has to do with the health of ballast water which has been the source of a number of marine pests such as sea stars and seaweed. The marine pests can be carried in ballast water from one place to another. Peter Grant is sure there are individual rangers who have contacted people around the world.

The international agreement or treaty may start at the local level with somebody here saying that it is important to do something about a particular issue and then finding the links to State or Commonwealth Government and then into the international community.

In response to Q6, Peter Grant replied that greenhouse gas emission is a big issue in Australia at the moment because the government is holding back from signing the treaty that limits their output. Australia is very dependent on burning coal to generate electricity and this produces a high content of greenhouse gases.

Australia is unpopular for its greenhouse gas emissions but the state of Tasmania is not so unpopular because it has hydro electricity power so does not have the problem of other Australian states. But Tasmania has air pollution problems, particularly in Launceston, but sometimes in Hobart, with domestic wood smoke. Tasmania also has some airborne pollution from factories and water pollution

downstream from the Pasminco Hobart and the Australia Newsprint Mills (ANM).

Tasmania has heavy metal pollution, certainly on the west coast but there is some in the Derwent river as well. Peter Grant thinks cadmium and some other pollutants come from the Pasminco Hobart factory and probably other sources as well. So for a state with low population, Tasmania has a surprising amount of pollution.

In answering how the pollution problems would be solved, Peter Grant thinks education is obviously very important and this will be discussed in the next question. He thinks Tasmania needs to have strong laws. Too often in a state like Tasmania where there is high unemployment, an employer or a company that pollutes would say 'if we have to comply to pollution control then we have to lose jobs'.

So the authorities will grant them a permit to pollute. He thinks it would be far better for awards to be developed that encourage people and congratulate companies when they are not polluting or when they reduce their pollution. There should be incentives for companies to pollute less and less and eventually not at all.

In response to Q7, Peter Grant replied that there is very little coordination of education between governmental agencies but there is an increasing amount of educational materials being produced, because there are a lot of demands from teachers, students and parents.

Environmental materials are being produced, therefore it can be assumed education is taking place in some form or another. It is almost as if it has been started from the ground up. People want information on these subjects and children want to learn.

Peter Grant thinks ultimately the aim is to have environmental education or environmental studies right down to primary school level. This happens in his own children's school. They have been monitoring the water in the Hobart rivulet and doing a number of other environmental projects. If you start with children, that is a great place to start; that is where education can be strong and effective.

Peter Grant thinks the NPWS suffer from education being squeezed, being made into a small component of their work and so they do what they can and they provide materials but they do not put enough effort and money towards actually providing education and helping others to do it. They have developed a website which is educational. They have a threatened species teachers' kit which has a website plus a folder and individual work sheets and educational suggestions.

Although they do things, it is a bit uncoordinated. He thinks that they have not necessarily got a long-term plan. They will work towards ticking things off. They have informal networks, for example, in the areas of interpretation. They have an interpretation association and that includes people from places like Forestry Tasmania and Port Arthur, the NPWS and the industry involved in graphic design and printing. He thinks that interpretation is really an attempt to communicate and stir people up to think about issues and think about the places they see.

In response to the eighth question, Peter Grant replied that it is not so much the policy area that reduces the policy load the government has. He thinks the cooperation of the Non-government-agencies (NGOs) give the NPWS a greater work force. The government still works out the policy but often NGOs and volunteers and other people can effectively spread the word more quickly and can do the work on the ground which the NPWS does not always have the financial resources to do.

In response to the ninth question, Peter Grant replied that he understands one of the strong things in Taiwan which is fairly industrialised, is the use of technology and particularly computer technology. It would be interesting to see how Taiwan uses the technology and skills in those areas to communicate and enhance conservation with CD Rom or touch screen technology. It could be useful to

learn from Taiwan. The internet is more and more important for internationalisation.

Interview with Sue Haimes

After the restructure of the Department of the Environment and Land Management, the Parks and Wildlife Service planning system was divided into Northern and Southern regions. Before the change, there was a planning team located in Hobart responsible for projects throughout the State. There was a planner in each of the regions in order to have a closer relationship with the National Park ranger staff. Sue Haimes was the southern region planning officer and helped the rangers with planning work when she was interviewed.

Each major reserve has a management plan, which provides basic guideline for site management. The plan is created after consultation with the public and rangers who are on site and have long experience in that area. It requires a lot of involvement so normally takes a long time to produce.

The management plans are legally binding documents and the top level is the strategic management plan which is required to manage the National Parks or World Heritage Areas and establishes procedures.

The next level of management planning is site planning or site design which looks at particular sites. This is usually associated with visitor facilities such as visitor centres where those arriving at a National Park can receive information on car parking, toilet facilities and other information needs. This is more the level at

which Sue Haimes is working and she also acts as a medium between the ranger staff and the rest of the planning units. She is also concerned with planning issues outside the department such as those involving local government planning schemes.

This position had only just become official, but Sue Haimes had been acting in it for about a year. Previously she was a site-planning officer for the World Heritage Areas for about four years. A lot of the areas are actually in the southern region and she progressed naturally to her present job. She had been mostly dealing with the South-west National Park, Mt. Field National Park, Liffey Falls, Cradle Mountain and Central Plateau. The areas in the north had been handed over to the northern region planner.

In response to Q1, she replied that the way the department tackles the introduced species, especially in the World Heritage Areas, involves the help of specialist officers who have developed plans in their specialty areas. Firstly they look at where the introduced species are, and the severity of the problem and what impact they have on the natural fauna and flora. Then they develop management guidelines for these situations. Zoologists concentrate on particular species like goats and cats. Cats are a major problem, particularly on Macquarie Island.

The Department of Environment and Land Management has just received a grant to eradicate cats on the island. Although no domestic animals are allowed in the

National Parks and World Heritage Areas, there are escaped or released domestic animals which have gone wild and become feral animals and this is very difficult to control.

Sue Haimes commented that 'one can have laws but cats don't read!" There are feral animals in the World Heritage Areas and the rangers rely on reports on these from the general public. There is an additional problem when houses are close to natural reserves. With this situation it is not possible to totally eradicate the introduced species. One might eradicate part of an introduced species' population but the population normally comes back, or even increases. The specialist and ranger have to work together to tackle the problem.

On Maria Island, there is a special problem, the introduced Forester Kangaroo being over-populated and having to be culled. The culling program is very sensitive especially since the kangaroo is considered an Australian faunal icon, so this has developed into a sensitive political issue.

In response to Q2, Sue Haimes replied that the National Parks and Wildlife Service (NPWS) have a Bushcare coordinator who works with Landcare groups and a Coastcare officer who works with Coastcare groups. NPWS support the Landcare concept and has developed its own care programs, not just involved with Coastcare and Landcare groups but forming a Wildcare program for groups to specifically help with National Parks.

Most of the Landcare and Coastcare groups are dealing more with semi-urban or rural areas, whilst Wildcare groups are similar to them, but are working in National Parks. The public can get involved in a numbers of different ways; they can actually become involved in planning, helping the rangers doing the work on the ground, or they might get involved with taking guided tours in National Parks. This broadens the Landcare concept. Because National Parks do not have vast areas of cleared ground, they do not have the Landcare issues which are evident particularly in rural areas where there are major cleared areas.

In South-West Tasmania, particular in the Arthur Range, where NPWS have walking tracks, there are highly sloping areas but because of the high degree of vegetation cover in that area, erosion is not a serious problem.

Most used areas in the National Parks are around the visitor centres and they are usually managed quite well because of hardening of the ground surface. They are designed to cope with heavy use, as are the tracks, and camping areas. With tracks NPWS have a track management strategy and a system of practice classification.

Some tracks need to be designed to a certain standard to cope with the particular types of use. Close to the visitor centres high use short walks require boardwalks or other forms of track hardening. In the really remote areas they do not get many

people so they do not need to be on the erosion treatment list. Because NPWS has a vast network of tracks and they cost a huge amount to maintain, funding is allocated in terms of priority erosion control.

Apart from the walking tracks there is a problem where erosion is caused by boats, particularly on the Gordon River in western Tasmania where there is a popular tourist cruise. The bank erosion was proven to be caused by boat waves. Now the NPWS have restricted boat speed.

In response to Q3, she replied that NPWS tries to work closely with other agencies both state-wide agencies and local government. The responsibility for natural resource management is based on the tenure of the land. NPWS is governed by an Act of parliament that says NPWS is responsible for managing all state-reserved lands.

The NPWS also has a conservation role that extends across al land. For example if there is a threatened species involved then the NPWS has power to go on to private land. In terms of some aspects of conservation management, particularly threatened species, NPWS has the role of off-reserve management. It is also closely involved with Bushcare, Coastcare and Landcare which encourage private landowners to conserve.

Reserves in Tasmania have different levels of protection. The top level is the National Parks and the World Heritage systems, and there are also a number of other conservation reserves, wildlife reserves and recreation areas. They are all currently under the Act.

There are also a lot of Crown land areas that are managed by the DELM. DELM are reviewing the land classification process, aiming to simplify the reserves categories. Crown land, particularly the coastal reserves, are the responsibility of NPWS. With a state-wide agency it is possible to be a lot more strategic in the approach to problems.

In response to Q4, Sue Haimes replied that Tasmania probably has enough conservation regulations. The National Parks and Wildlife Act has got a very clear guided set of regulations which are needed to back up the implementation of conservation. She thinks the regulations in Tasmania are fairly good and the DELM believes that in addition to having regulations to enforce things, the matter of education is very important.

The department has the power to fine people but often at the time they do not. Rather they try to educate people to make them understand the reason behind the regulations, which is often a much more effective way of doing things. There is a central unit that backs up the wildlife enforcement rangers, providing advice on

legal procedures supporting them. This system is complemented by a lot of rangers involved in wildlife enforcement.

The wildlife enforcement officers deal with native animal smuggling and often they work with other law enforcement agencies like police and federal bodies such as customs. They are working together in a very covert way so people do not know that they are doing it. The NPWS have the power to confiscate guns and some of the marine authorities of the state agencies have the power to confiscate boats.

In response to Q5, Sue Haimes replied that Tasmania gets together with most natural conservation agencies from other states which form a national body for different international bodies like UNESCO and IUCN. The Commonwealth government has to abide by the international conventions and NPWS have an agreement with the Commonwealth to manage areas according to the conventions.

The UNESCO convention is concerned with protection of the world cultural and natural heritage and Australia adopted it in 1974 and became one of the first countries to recognise it. Under that convention, Tasmanian World Heritage areas were listed. Areas were considered by UNESCO for world heritage significance listing. There is no involvement with management at the international level.

There are usually forums for developing protocols and agreements, like working out the best practices for National Parks. Thus they are not binding but they are voluntarily based. There are more environmental associations than management authorities in Australia, and Tasmania is represented on many of those different groups, such as Greening Australia.

In response to Q6, Sue Haimes commented on water quality in the field that there is an evvironmental impact where there is no access to sewage systems. This requires the NPWS to develop different types of toilet/sewerage systems. The NPWS are aware of and monitor the water quality to various degrees because it has impact on the natural environment.

Tasmanian natural ecosystems are very nutrient-poor. Human effluent has high nutrient levels and impacts on the natural environment with the added possibility of health problems. The NPWS do not have very many powers to say what people should do on the land adjoining theirs. They try to work cooperatively with people, encouraging them to do the right thing and visa versa.

In most of the areas, NPWS is encouraging people to follow the 'you take it in, you take it out' policy for waste management. In other places like Mt. Field National Park there is high use and people do not come prepared to do that. So in some of the highly used areas the NPWS provides rubbish bins, but not in the

lower-use areas, because it would be very inefficient for them to service and there would be a lot of problems with wildlife searching for food around bins. Littering is generally not a major problem in the National Parks.

In response to Q7, Sue Haimes replied that education is vitally important for several reasons. It is important in terms of educating people to value the environment, to conserve it, to treat it well so preserving the environment. Education gives support for the concepts of National Parks and World Heritage areas so it is a sustaining thing for conservation and it is often a more effective way than enforcement for getting management messages across.

Generally speaking education encourages people to value the environment they live in so they do that with caring thought and not just in National Parks but in the total environment of their surroundings or in the state or the globe.

In response to Q8, Sue Haimes replied that NPWS has worked with Non-government Organisations and more so in the past few years. A lot of the NGOs previously dealt with semi-urban or rural areas but increasingly they are coordinating with the NPWS. Australian conservation volunteers, work on projects involved with the National Parks. More often the NGOs are associated with Commonwealth programs. The NPWS, in the case of Coastcare, is involved in the actual administration and allocation of the grants for the program.

In response to Q9, Sue Haimes replied that Tasmania has a ranger exchange system with New Zealand and has visiting delegates from places like Mainland China. It has also brought in people that worked on walking tracks in Scotland, where the highlands are similar terrain to Tasmania. The NPWS encourage the exchange where each can learn a lot from the other. This is not just at a state level, it can be at local government level also.

There is always room for learning and exchanging ideas. In the case of changes such as introducing Park entrance fees, the NPWS would look and see what happens in other states or in other countries and try to find out what problems exist and look at the best system to suit National Parks.

Interview with Wen-Yao Miao

Mr. Miao worked as an assistant for a year and then took over the position of coordinator for natural reserves for less than half an year while the person in charge was on leave at the Resources Conservation Division of the Forestry Department in the Council of Agriculture.

In response to Q1, Mr. Miao replied that introduced species issues are not his responsibility therefore he does not have any comment.

In response to Q2, Mr. Miao replied that he only comprehended nature reserves but not other issues. The Natural Preservation Areas are declared by the Council of Agriculture and are based on the Cultural Preservation Act. The Wildlife Protection Areas are declared by the city or county governments and are based on the Wildlife Conservation Act.

The National Forestry Natural Protection Areas are declared by the Forestry Bureau of the Taiwan provincial government and based on the administrative decrees of the Forestry Act. Only based on the administrative decrees and not an

Act, the National Forestry Natural Protection Areas do not have as strong a legal basis as the Natural Preservation Areas and the Wildlife Protection Areas.

There are two categories within the Cultural Resource Preservation Act, the Ecological Preservation Areas and the Natural Preservation Areas. In the interests of unified terminology, the Council of Agriculture just uses the one term Natural Preservation Areas, whereas there are Ecological Protection Areas in the National Parks.

The Council of Agriculture entrusts the city and county governments to manage the Natural Preservation Areas. It is prohibited to change the original natural status of the preserved areas. There is a conservation operating measure, similar to an administrative decree, to regulate that only academic research and promotion of environmental education activities are allowed in the Natural Preservation Areas so as to preserve the intact natural status. The Council of Agriculture mainly interprets laws and decrees and plans related to regulations but does not actually involve itself with management.

In response to Q3, Mr. Miao replied that different laws and decrees, ie the Cultural Resources Preservation Act, the Wildlife Protection Act, the National

Parks Act and the Forestry Act, regulate different reserves. Each reserve has its own objective to protect specific species or preserve certain habitats, so there are different management measures and aims for different governmental agencies.

In response to Q4, Mr. Miao replied that depending on the preservation objective, different laws would be employed to manage reserves. The Cultural Resource Preservation Act was passed before the Wildlife Protection Act and other related legislation. Only in the last chapter of the Cultural Resource Preservation Act have rudimentary regulations concerned with Natural Resource issues been promulgated.

The Culture Resource Preservation Act is now in process of revision but because the main part of the Act is about culture resource management and is involved with the Council of Culture Construction, this process is complicated.

Furthermore, the management planning of the Natural Preservation Areas was not comprehensive in the beginning so there are subsequent difficulties of implementation. For example, the prohibition of changing the natural status of a reserve will encounter the difficulty of the necessity for modifying or interfering with a small or sensitive habitat to ensure the preservation of protected species.

When it is necessary to modify the natural environment within a reserve, this would conflict with the Cultural Resource Preservation Act. Therefore the Act needs to be revised to resolve the difficulties for the conservation actions.

In response to Q5, Mr. Miao replied that because Taiwan has not signed any international treaty and as environmental legislation does not officially recognise term such as 'wetland', none of the International Wetland of Significant Reserves exist in Taiwan. Nevertheless, there are wetland-related reserves located along coastal wetlands and alpine lakes.

Since 1997, through non-government organisations, Taiwan has worked with the Japanese National Bird Society in researching migration of the blackface spoonbill, which is an endangered water bird.

From 1992, the Council of Agriculture, together with the Taiwan provincial government and Tainan county government, began to plan a blackface spoonbill sanctuary for conserving a wetland for the water bird. But due to the resistance of local people and a proposal for an industrial development in that area, it has been delayed and is still in the negotiating stage.

Although no Natural Preservation Area has been declared, the government employs rangers to protect blackface spoonbill as they are on the list of endanger species under the Wildlife Protection Act.

In response to Q6, Mr. Miao replied that Taiwan has limited land but a large population. The remaining natural reserves are very fragile and not suitable for development for the public, especially the coastal areas. Yet the pressure for economic development and residential demand makes conservation a very difficult task. The first Natural Preservation Area was declared in 1991.

Financial and manpower resources are restricted and insufficient, and conservation issues in one reserve involve many different governmental agencies, making conservation very difficult to achieve.

The pollution problem cannot be handled by the reserve administrative government agencies solely. When rubbish needs to be cleared, the administrative agencies do not have the budget and human resources to deal with it and the environmental protection agencies refuse to help because the rubbish is inside the reserves. It is important to coordinate work between different

governmental agencies to resolve the lack of resources problem in the reserve administrative agencies.

In response to Q7, Mr. Miao replied that promoting environmental education takes time. In the case of local people and county government who were against establishing a blackface spoonbill in Tainan, the Council of Agriculture has to hold public hearings and listen to the voices of the local community.

After discussing the issues of reserves and industrial development, and after alternative economic considerations have been put to the public, hopefully the resistance of local people might be decreased. This will make the public think positively and win their support for conservation. Once the local community can accept and become involved with reserve management, habitat conservation would be truly implemented.

In response to Q8, Mr. Miao replied that the Council of Agriculture funds some Non-Government Organisations, e.g. bird societies, and allocates funds to provincial and city or county governments to manage reserves and to promote environmental education. The city or county government works with local

schools or Non-Government Organisations for research and management of the reserves.

In response to Q9, Mr. Miao replied that Taiwan can learn from other countries how to promote the concept of natural reserves and how to let the public generally acknowledge the concept. It is not enough having romantic enthusiasm for conservation but a practical way of management is vital. The technical details of managing a reserve, e.g. how far should humans interfere in the natural succession process, could be a very useful lesson to learn.

Interview with Peter Mooney

Tasmania had been split into eight districts by the Department of Environment and Land Management and Peter Mooney was in charge of one of them when he was interviewed. He had been the South-east district manager for about six months. He had a number of staffs, mainly rangers and administrators. The rangers do all the groundwork in the reserves and also look after the injured wildlife. Their job is to manage the regulations and Acts which the department administers. He has been working in Parks for nineteen years.

Peter Mooney started as a trainee, did a four-year trainee course and then became a ranger. He has worked in a number of places, including Macquarie Island, Flinders Island and the Southwest Tasmania. He also worked on feral deer management. He has thus worked in most different types of reserves as a ranger, researcher and manager.

In replying to Q1, Peter Mooney answered that introduced animals are a problem all over the world, not just in Tasmania, and the one of the biggest problems he thinks is making people aware that introduced animals can change the natural environment. One of the difficulties in Tasmania is that Tasmanians have used to the same farming practices as in England.

When the English settlers came to Australia, they wanted to create the same environment as if it were England. That is why they planted all the apple trees and also put in English crops, and raised sheep and goats. Deer hunting, which is a sport in England, was the reason why deer were introduced to Tasmania. A lot of species were introduced very quickly. The problems they caused were only realised later. Deer are very easy to cope with, because they are big and obvious. The most difficult introductions to cope with, especially now, are the small animals which are easily transported.

The other thing that has changed in Tasmania, as in other parts of the world, is the method of transportation. Before it used to take months to get from the other side of the world to Tasmania whilst now it only takes hours. Animals and plants can survive easily now from Europe to Tasmania whilst before they would have died on the way here.

It is very difficult for the NPWS to try to manage introduced species because a lot of people have their private collections of animal or plant products. It is much worse to have living creatures than dead collections because they can breed and can be released in the wild.

The other thing about Tasmania is that it is not only different from the rest of the world but also has animals that the Australian mainland does not. Endemic

animal conservation can be difficult because Tasmania is so close to mainland Australia and is vulnerable to the introduction of exotic species from this source.

One of the best things the NPWS has to do is educate people on why it is bad to have introduced animals, how they can affect everything in the long term, not just one or two species. The sea star that affects the ecosystem in the Derwent River is a good example. With animals and living things often come viruses, diseases and parasites which Australian animals have no immunity to.

It is not just the single animal, but what it brings with it as well. It is a difficult problem because it is so difficult to regulate. The only way to do it is to educate people and make them aware and try to realise what is native and what is not, and that has to start at a very low age in school.

Tasmania has different classes of reserves. Some reserves have more protection than others do. It all comes down to what the NPWS allows people to do in the reserves. In reserves with the highest class and protection, the NPWS try to regulate and control where people can go and no dogs or cats or pets are allowed. There are others which have been developed and changed a lot by man.

The NPWS let people take dogs and horses for exercise and use the areas as general playgrounds. People need somewhere to go with their pets, and if the NPWS do not give people somewhere to go, they just keep trying to go to

National Parks. These general reserves allow dogs and horses, and since the animals do not know the boundaries, it all comes back to people's behaviour, what people do. If the NPWS manage what people do and control what they do, and make them aware that there are good things to do and bad things not to do, it usually does not matter what happens to the land and the ocean, because it will look after itself. They were here before human beings.

The biggest difficulty is ignorance and lack of knowledge about what is in the environment. A good example is near Seven Mile Beach and the Tasman Peninsula, where there is the Eastern Barred Bandicoot, a small marsupial. The NPWS have to explain and tell farmers and people the best time to cut grass and the best time of the year to crop for different plant species like oats, to help the Eastern Barred Bandicoot.

At the same time, farmers still get a good income from the land. The NPWS have to do a lot of work with farming groups to try to have them manage their land so they make money but not destroy wildlife unnecessarily. Once they learn about the behaviour of the Eastern Barred Bandicoot, they are usually very cooperative.

The other story is the Forester Kangaroo on Maria Island. They were introduced and because Maria Island is an enclosed environment, when they reach a certain population it ends up being too many for what food is available, so they start dying naturally and then get down to equilibrium.

The problem is that it is not acceptable to the visitors who do not want to see dead animals. So the NPWS have to go in and kill the Forester Kangaroos before they start dying of starvation. The NPWS are interfering and have to do it because of public pressure.

Culling programs also take place with other animals in Tasmania. Deer and other animal populations become greater than they would be in the normal natural environment because there is a lot of food available and they are very opportunistic. Some years there are many more possums than usual.

It is the same with kangaroo and wallaby and it all comes down to what the farmers have planted and the fact that a lot of fencing has not been made kangaroo or wallaby proof because it is too expensive. The farmers either cull the animals by shooting or poisoning under permit from the NPWS.

The NPWS have to inspect the properties and see what damage has been done and then work out the best solution. The farmers need a permit to control animals from NPWS but usually if there is a valid reason, there is no problem in getting a permit. Sometimes if the reason is not good enough, the NPWS do not give a permit, maybe because not enough damage has been done by the animals or the farms do not have fencing at all.

Sometimes the NPWS have to encourage farmers to make an effort to try to keep the animals out. Increases in natural populations can occur quickly and cause problems in the natural environment such as over grazing and erosion.

In replying to Q2, Peter Mooney answered that Landcare is very successful in Australia and there is a lot of money being put into it, many millions of dollars. He believes that Landcare and Coastcare and Greening Australia have made farmers and others realise that water is very precious and that when water falls on the ground, it just does not stay there, but travels to the ocean. This realisation leads to catchment management. A lot of his work is catchment management now and working with farmers, councils, Coastcare groups and the public to try to get an agreement on the whole catchment area, on what people should do and should not do.

One of the difficulties in Australia has been the damming of rivers. This stops the regular movement and that causes problems like algal blooms and salinisation. One of the biggest issues is the clearing of vegetation along river and creek banks. There is a Forest Practice Code, but still there has been too much clearing done already, so people have to replant the vegetation.

Funding for Landcare, is in a dollar for dollar basis. The government puts in the money and the community has to show that they are putting in their money too.

This can be done in different ways, as a community does not have to actually come out with cash in hand but they have to come with labour and materials.

The Southern region has eight districts, and in all of them the community has volunteered its time on Saturdays and Sundays. The government buys the materials then the work is done by the community with the help of the NPWS. People donate their time for a common cause. This is not on their land but usually on public land. This voluntary approach has only been common in Australia for the last ten years.

The government has to come first to make Landcare work, because people have to rely on government providing seeding money and ideas and then people will follow. You have to have a leader and the leader has got to be the government, because if the government does not take the responsibility, it would not happen. Yet the present Commonwealth Government does not want to put a lot of money in from now on.

They want people to take over but the difficulty in Australia is that sometimes unexpected things happen, such as El Nino, the drought, and the downturn of wool and beef prices. This means that there is not a lot of money in the rural communities, so there is not the money there for them to take over the Landcare funding.

In replying to Q3, Peter Mooney answered that conservation systems vary in different States and Territories. In Tasmania, NPWS look after all Crown lands whilst in New South Wales, the National Parks Service only looks after National Parks. It works similarly in Taiwan and they have big difficulties because different departments could have different or even opposite opinions about the same subject. This makes the public very confused and to resolve this, it is better to have one department deal with a subject.

If there is still more than one agency in charge of one issue, it really needs a good policy that is agreed to and written down, such as the Coastal Policy in Tasmania. The Coastal Policy talks about how we need to look after the coast and how we need to be careful with development on the coastline in Tasmania and considers aspects such as marine farming, tourism, transport and other issues.

The Policy is a guide for councils, marine farmers, NPWS, Forestry Tasmania and all people involved. If they all adopt this guide, it will work smoothly. It is very difficult because it needs to have agreement to ensure things happen and sometimes two parties will not agree about something.

After all the government agencies have agreed with and adopted a policy, it still requires a lot of cooperation. It is not easy because there are still problems

though it is far better than without a policy. If everyone has the same intention, it might get the results in different ways.

For example if everyone agrees that people have to save as much water as possible and people have to have best quality water, it means people all want the same thing, but there might be different opinions on the method of its achievement. Sometimes people get very jealous of their work area and they do not want anyone to invade it. It does not matter, as long as everyone is aiming for the same result.

In replying to Q4, Peter Mooney answered that environmental regulations are the backbone and backup of environmental management so they are very important. Sometimes people will not accept any of the NPWS's information or they do not agree with any of it and that is where the government has to use legislation.

In the morning of the same day as the interview, Peter Mooney had an instance where people were building their house along the coastline and they were bulldozing all the wastes onto the coastal reserves. Peter Mooney was there and put a stop-work order on the work. The offender was very angry but he will be prosecuted. Peter Mooney did an interview with the offender and it will be written up.

This is an example of someone who knew the rules but he did not obey them and he was not going to stop. The only way the NPWS can stop him is by getting a policeman in and enforcing the regulations. Sometimes this has to be done and shows everyone in the neighbourhood that people cannot just go ahead and do what they like. The worst thing is if the government let people to get away with breaking the law then everyone will do the wrong things.

The reason Peter Mooney had to use the police was because the offender was very angry and was going to hit Peter Mooney, so a policeman was needed to calm him down. The NPWS have the power to stop work and prosecute and book offenders but not everyone does it.

In Peter Mooney's district, there are twenty staffs but only five that do law enforcement. They are specially trained. They have to be very careful about how they do it because they have to produce proof of evidence for court and a judge will throw the case away if they do not have the right bits of information. It is best to have a small number of people who are very good at it rather than trying to get everyone to do it with only half of the cases being successful.

The difficulty is that people do not know the environmental laws. They do not know that such laws exist and the NPWS do not really tell people. Often the only way people find out about environmental law is when they are doing something

wrong. The regulations are good as they are but they need to be advertised to the public more.

The public needs to know the environmental laws are there. Environmental laws are not like road laws. Not many people know about them and very few people have an understanding of them. This is where you have got to start teaching, through schools and in courses.

In Peter Mooney's district, they have partnerships with schools. They bring the school groups out for environmental days and they discuss environmental issues with children and the children often go home and tell their parents. The NPWS found that is the easiest way to educate people. Some of the protection laws are not good for big development because the laws can over-rule development.

When it comes down to the planning issues, that is a different area. Planning in Tasmania is quite different from other planning areas because of the right of appeal. If a company wants to build a factory, they have to advertise it and anyone in the community can object and this is a good tool. This has been used a lot and often the objection has been made on environmental grounds. There are a lot of practices in Tasmania, which have existed for a long time, and companies such as EZ Hobart and Pasminco Burnie have exemptions from environmental laws. That makes it very hard to implement the laws because if the government gives one company a permit to pollute, it is hard for others not to get exemptions.

In replying to Q5, Peter Mooney answered that there are several places in Tasmania near Seven Mile Beach which are delicate under the Ramsar treaty categories. The Ramsar reserves involve a number of countries, because the birds live in different countries and migrate so that all countries need to look after the habitats for those birds. This is an agreement between all the countries that they will look after the habitats. The treaty is quite strong but relies on the commitment of countries be involved.

Tasmania manages some areas under international agreements, such as the World Heritage Convention. This is not as formal a treaty as Ramsar. A treaty is a document signed by countries, whilst the World Heritage Convention is only guidelines that countries agree to, there is no signature.

The Commonwealth Government signs the international treaty for Australia, but it is up to the State Governments to honour that signature. In a way, the Commonwealth Government says if the State Government does not manage this, then the State Government will not get funding for other areas. For example, they might say, 'if the State Government does not manage the Ramsar reserves in Tasmania, the Commonwealth Government will not give the Tasmanian Government extra money for the roads.' That is how it operates and it works well.

In replying to Q6, Peter Mooney answered that if the behaviour of people could be controlled, environmental problems could be fixed quickly. In Australia and especially in Tasmania, people develop their housing outwards not upwards. This is a problem and the Australians should really have people living more densely in small areas so more natural areas could be left undeveloped.

In Tasmania, one of the worst things with conservation has been the development of land for housing and the spread of the new development of roads, telephone lines, power lines and water systems to the new houses. All these services spread a long distance, destroying land just to supply services for one house or two. Australians could have all those houses together and have all the services in a smaller area and have more land available for conservation. Australians want to have land in their property and it is very difficult to change.

The local governments have gone a long way in their planning and zoning. There is good zoning in Australia. Sewage treatment has improved and the end product, the final water is good enough to irrigate crops and trees and in the long term, it is hoped the water will be good enough to drink so it is a full cycle. In some big cities, such as Sydney, the sewage treatment is good but it is very expensive and that means people have to pay very high taxes to get it done.

In Tasmania there are three different systems for waste water disposal. The first system is the storm water which is rain water on the streets and down the drains.

The second system is the soilage or grey water which comes from the shower, and household sinks. The third system is sewage water from the toilets. Often the sewage and grey water is mixed up in small treatment plants because it is too expensive to separate them.

In replying to Q7, Peter Mooney answered that in the long term, environmental subjects must be core subjects the same as mathematics, chemistry, geography and English. Because people have to realise long term issues such as recycling, water and soil conservation are very important, they need to be learnt very early so, as children grow up, it becomes common knowledge and does not even have to be thought about. This is the only way to go in the long term.

In the short term, the land managers and rangers still need more training in general conservation rules. Most of the time the managers and rangers have good training in understanding ecology but they have little training in 'true conservation' which is how to put systems into place and give advice on how farmers can save water and conserve energy. In Australia there is so much sunlight but so few solar power systems.

The environmental conservation managers should know a lot more about that, so they can give out that information. The environmental conservation manager is one of the people who sees people every day in their work. Peter Mooney

sometimes sees fifty to sixty different people in one day, and if he can give them the right information and messages, that would be very effective.

In Tasmania people are still a bit slow in some areas of communication that is mainly on a one to one basis rather than mass communication, so the public are still not well informed. The government should start showing by example that conservation can work and it is cheaper in the long run. All government buildings should use solar power, but it is very hard to initiate.

In replying to Q8, Peter Mooney answered that the biggest advantage for NGOs involved with government is that all these volunteers end up being the NPWS's eyes and ears. They see things every day that the NPWS can never see. When they see someone doing something wrong, they can telephone the NPWS and it can be fixed up straight away. Because they live there, they know the local affairs.

Another benefit of working with these people is that there is peer group pressure. For example, if there are houses along the coastline and some of the people in these houses are members of the Coastcare groups who are working with the NPWS, they learn to understand conservation. Those who are not members of the Coastcare groups might start cutting trees and putting rubbish on the reserves.

The Coastcare group members will come and tell them not to because they do not agree with it. Before, people working with the NPWS, would never tell the offenders because they would not know the difference. This peer group pressure works very well because it is not like a policeman type attitude but a neighbours' approach. When a neighbour tells people something, people tend to want to do it more than if the policeman tells people to do it. It is a big benefit that cannot be measured in dollar terms.

There are lots people who look after sections of beach. They adopt sections of beach for the NPWS and they keep an eye on that section and keep people, dogs and horses away from the eggs of sea birds. Sometimes the people sit there all night so the sea bird eggs will hatch and the chicks will live. Previously dogs would eat the eggs.

In replying to Q9, Peter Mooney answered that the basic principles of conservation are the same all over the world. The biggest thing Tasmania might be able to show Taiwan is that there are areas where it will never be possible to farm the land again. Where all the nutrient-rich topsoil has gone, because it is lacking vegetation cover and the surface is exposed. Tasmania is able to show Taiwan photographs of the Midlands where all the trees have gone and Tasmania is trying to replant quickly.

There are the same principles being applied, such as energy conservation, leaving more natural environment and trying to change people's behaviour and so on. Taiwan is no different from Tasmania in this aspect. There are different languages but it is all the same issues and people have to realise that when they have done something with the water in the river, it affects everyone right down to the ocean.

A lot of marine farms have been polluted because people pollute the land. It is necessary to be very careful where logging occurs on the top of a valley if a marine farm starts to operate at the mouth of the downstream river. So it is important to think of all of these connections.

There is a difficulty in that Australia has different names associated with conservation and people get confused. There are fifty-eight different types of reserves in Tasmania. The government is trying to make only six basic types of reserve in total and the reason is to make it simple for the public so they understand and follow the rules. A lot of reserves have different names but they actually are the same. The important thing is how to manage reserves not the name so the reserves system should be simplified.

Interview with By-Lu Tsai

Mr. Tsai was the superintendent of the Yang Ming Shan National Park at the time of interviewing. His speciality is city planning. Since 1979, he has been involved with on-site survey, drafting and investigation and proclamation of National Park plans. He participated in the planning of the first and the second National Park in Taiwan.

Mr. Tsai feels proud of the development of National Parks in Taiwan because in just less than twenty years, compare to about one hundred and twenty years in the United States and nearly seventy years in Europe, the Taiwanese National Parks have been established and well managed. The hardware and software of the interpretation and education for the public are effective and as good as Japanese and Korean counterparts. The National Park system is based on the United States system.

In response to Q1, Mr. Tsai replied that the introduced species problem is a big task at present in Taiwan. It is a trend now that everything emphasises being localised: school curricula try to use local materials for natural and social studies

and politics stresses using local talent as much as possible, yet only ecological localisation has not progressed as far.

Taiwanese people have to value local animals and plants and protect endemic species well. If conservation of native species is not taken seriously, they will become extinct. In addition, to investigate and record the details of the native species, protection of their habitat is very important. A factor affecting local species is introduced species.

In recent years, foreign species were introduced to Taiwan on a large scale for reasons including commercial use for agriculture and to provide for the pet market. To keep wild animals as pets and breed them rapidly is very inappropriate. This could introduce fatal diseases to native species and even human beings.

The other serious problem is the public freeing the captive animals to the wild, which might be the well intended but could cause a disaster for natural environment. The public should be educated that the behaviour of keeping pets and releasing pets is to harm rather than to love pets.

In response to Q2, Mr. Tsai replied that enterprises are very much willing to be involved in environmental protection recently in Taiwan. The non-governmental strength is enormous and is extremely beneficial to utilise. Environmental protection is an overall business. Government has to be responsible and should encourage non-governmental sectors to work together.

In the YMSNP, voluntary interpreters (ranger volunteers) are willing to help National Park by providing interpretation services for the visitors. They cherish their contribution to environmental education but are not motivated by payments for their services.

There are about two hundred voluntary interpreters who provide around twenty thousand hours per year which saves three to four million New Taiwan Dollars for the YMSNP. Volunteers help National Parks in terms of providing both human resource and financial assistance.

In response to Q3, Mr. Tsai replied that the Taiwanese government separates environmental tasks into two parts, environmental protection and conservation. Mainly concentrating on urban environment pollution issues, environmental protection deals with the pollution effects of civilisation. Yet it also relates to the

protection of nature. At present, the central governmental agency for environmental protection is the Environmental Protection Administration which is mainly responsible for air, water and noise pollution control.

Nature conservation covers the urban environment thus its task is broader than environmental protection. Therefore it will be difficult to achieve environmental protection if the task of nature conservation fails. The central governmental agency for nature conservation is the Council of Agriculture, which is a production agency.

That nature conservation is managed by an agricultural production agency raises the issue of suitability. Because agricultural production sometimes affects the natural environment, through large-scale chemical pesticide and fertiliser usage; therefore nature conservation managed by the agricultural development agency is not appropriate.

The central government agency in charge of National Parks is the Construction and Planning Administration at present. National Parks in Taiwan have three main objectives. They are nature conservation; environmental education and

research; and recreation. It is a better way to integrate natural conservation and National Parks into a central government agency.

It is better not to separate environmental pollution controls and nature conservation tasks to different agencies. As a whole governmental structure, if there are two agencies overlapping in their responsibility, the task will be very difficult to achieve. If related tasks are integrated into one agency, it will be much easier to implement policies and laws.

From the public administrative efficiency point of view, environmental protection and nature conservation should be in the same agency because it is difficult to separate these two tasks in a clear-cut manner. It also would be better if National Parks were under such an umbrella agency.

The Taiwanese government intends to form a Ministry of Environment in the future. It would be desirable to extract the present nature conservation agency, the Resource Conservation Division under the Forestry Department of the Council of Agriculture, and integrate with environmental protection to create a higher level agency. National Parks can be administered under such integrated agency.

In response to Q4, Mr. Tsai replied that the first important factor to implement the environmental task is legislation, the second is sufficient staff and resources, and thirdly, a set of guidelines for implementation are needed. It is essential to have legislation for administration and for prosecution of illegal activities. It is equally important to have an agency to administrate and implement a task. If not, there will be a terrible situation in Taiwan.

Legislation is the foundation for all. The National Parks Act was passed in 1971 in Taiwan. Although there are rules for implementation and general rules for agency structure of National Parks and National Park Police to implement the National Parks Act, other laws are still required to prosecute illegal operations.

The Forestry Act and the Water and Soil conservation Act are more severe in their penalties than the National Parks Act and are usually employed in National Parks. The National Parks Act is not perfect and needs to be revised properly to serve its function.

On the other hand, if there is not an agency to implement legislation then the legislation is just a decoration. Many Natural Preservation Areas in Taiwan are in

this situation. They are proclaimed by the Cultural Resource Preservation Act but lack staff to administer them. Setting up of these areas is thus in vain. The reason that National Parks are on track and the other reserves are not, is that National Park has an administrative agency and is granted the necessary budget and staff, and a set of guidelines, the National Park Plan, for implementation.

In response to Q5, Mr. Tsai replied that as a member of the global village, Taiwan should observe the agreements between nations that include international treaties for environmental protection. Taiwan should not be absent from any international treaty. Although Taiwan is not a formal signatory country, yet it still abides by the international treaties.

Conservation is a global issue that concerns nations all over the world. The emissions of carbon dioxide and other chemicals into the atmosphere, causing global warming and acid rain, and the introduced species problem are obviously issues that cross the boundaries of countries.

If Taiwan wants to be accepted as a formal member of international organisations then it naturally cannot stay aloof from conservation coopreation. It is a good phenomenon that Taiwan is getting more and more contact with international

organisations in recent years. Taiwanese National Parks ought to establish sister parks and other forms of experience exchange with other countries in order to be recognised as a member of international society.

In response to Q6, Mr. Tsai replied that the most serious environmental pollution issue is waste treatment in Taiwan. Compared to Hong Kong, Singapore and South Korea, Taiwan is the worst in the four so called 'Asian four little dragons' for waste treatment. Although there are improvements with incinerator treatment in metropolitan areas, i.e. Taipei and Kaohsiung cities, in recent years, the other areas still have not progressed and the problems are even worsening.

According to the plan of the Environmental Protection Administration, each regional government should treat their waste but no one wants incinerators to be located at their back yard. Furthermore, landfill refuse tips can not resolve the problem and will cause soil and water pollution. Thus, waste treatment is the biggest task in Taiwan and lessons could be learned from overseas.

Water pollution and water resource management are the other big tasks. Taiwan will have to pay an enormous price for water management in the near future. There are more and more dams which have been constructed but the quality and

quantity of water are both very bad. People even have to buy drinking water in southern Taiwan, as the tap water is not drinkable.

Water is a death and life issue for Taiwanese. If there is less rainfall during rainy season, the shortage of water is serious especially in the summer. It is not a solution to dam more rivers. Dams have been constructed next to cities but now are built further upstream.

Most rivers have been heavily polluted therefore it is impossible to build new dams downstream. Yet if a new dam is located further upstream, less water will be stored. Thus water resource management and water pollution control are interrelated and a big task in Taiwan.

In response to Q7, Mr. Tsai replied that educational issues concern a broader area and involve a larger level, it could be restrictively or extensively defined. There are many social problems that have occurred recently in Taiwan that are caused at least partly by school education. Public order and security are closely bound up with the education system. Education should start when babies was born and not wait until there are deviations to be corrected.

Taiwanese students face enormous pressure for the very competitive high school and University entrance examinations. Therefore, the focus of teaching is driven to the subjects which are included in these entrance tests. Now this is about to change and hopefully starting from primary school children have the chance to learn more about environmental ethics and not just knowledge to pass in examinations.

Schoolteachers play a very important role in passing on their attitudes and knowledge. National Parks have to assist teachers to enhance environmental education. The beneficial outcome of the school working with National Parks is that younger students are much better educated than adults are by National Parks. Despite being less efficient, it is still important to promote environmental education to adults.

National Parks should enforce environmental education through seed groups, that is primary and secondary schoolteachers and Non-Government Organisations. Training and working with them to spread conservation messages has a greater effect. Environmental education should reach and infuse all with respect for life. The essence is the teaching of a healthy relationship between human beings and the environment. This fundamental knowledge of human-environment

relationship is very important. It allows people to appreciate nature and be willing to live in an environmentally friendly way.

To inform the public about statistical information on nature is not so important as to encourage them to enjoy nature and think and relate to the environment in their daily life. It is not correct to simply introduce the name and facts about a species but the connection between nature and human beings.

In response to Q8, Mr. Tsai replied that the work of natural conservation and environmental protection are both gradually transforming from governments assisting non-government sectors to working together. The resource of non-government sectors is tremendous and limitless yet it still needs governments to complement these resources. It is a trend in Taiwan to let non-government sectors be involved with environmental management to supplement the tighter budget and manpower shortage of governments in the future.

In response to Q9, Mr. Tsai replied that there are many differences for nature resource management between Taiwan and Tasmania. Roughly dividing Taiwan into three parts, only one quarter of the land is flat area and is where most of population lives, about one quarter is hilly area and half of the land is mountain

range. Taiwan is a high mountain island and one quarter of plain areas all have been highly developed and rely on the other third quarter of high land support life resources, such as fresh water and air.

Food and other goods can be imported but not natural resources. The utilisation of nature resources in Taiwan is very important. The public should have the concept that everyone is closely linked with the thirty six thousand square kilometres of land and have to protect it. Otherwise human beings need to pay a greater price to repair the damage.

First, natural resources should be investigated and the quantity surveyed recorded, then it is possible to plan sustainable development. It is also necessary to learn management concepts and techniques from other countries.

Interview with Bob Tyson

Bob Tyson was a program manager for the Community, Visitor and Field Services (CVFS) branch at the NPWS when he was interviewed. This branch includes the Tourism and Recreation section, the Interpretation and the Technical Service section.

The CVFS branch deals with the facilities and planning for both tourism and recreation, such as walking track networking, visitor centres, car parks and toilets. The branch also deals with the various interpretation and education programs, such as the Minimum Impact Bushwalking and recreation campaigns, the Summer Ranger programs, Track Ranger programs, brochures and other educational information. The CVFS branch has a principle role in relation to dealing with visitors to National Parks.

The Community Partnership (CP) section covers off-reserve conservation issues and works closely with Friends of local area groups and with existing programs such as Landcare and Coastcare. The CP section is aiming for more community involvement. The Fire Management branch has the role of looking after the whole aspect of fire management from planning to on the ground fire suppression works. There is a seasonal fire crew of twenty people, which is an additional resource to the field staff and rangers.

Within the NPWS, other branches are the Conservation Strategy branch which looks after planning, policy and some of the off-reserve issues; the Natural Conservation branch which has the research responsibility for flora, fauna and geoheritage; the Cultural Heritage branch which looks after both European and Aboriginal cultural heritage.

The field staffs are divided to Northern and Southern regions. These two regions are broken into eight districts with four in the north and four in the south. The next level is field station, and most districts have two or three separate field stations. The NPWS manage about forty percent of the land in Tasmania.

In response to Q1, Bob Tyson replied that the introduced species issue more directly falls to the Natural Conservation branch. Looking from the field staff side, the CVFS branch deals with the introduced species directly, mainly related to on-reserve issues, such as weeds, introduced fungus and feral animals.

The outline strategy of the CVFS branch in trying to deal with introduced species is, firstly, to work out the need to educate people about what the problem is. That includes the branch staff, and quite often other arms of government as well so that everybody has a common understanding of the problem. Secondly, participating in the strategic approaches for tackling the problems.

For example, with the root rot fungus, the CVFS branch provides a public educational program. This includes information out in the National Parks on bushwalking tracks, which explains to the public that they need to scrape boots to remove soil to prevent transfer of the fungus. NPWS also make sure that helicopter are washed down before they enter or leave wilderness areas.

The NPWS work closely in cooperation with neighbours. As an example, there is a weed strategy for the Tamar Valley which includes private landowners, local councils, the NPWS and other agencies. There is a strategic approach to weeds to determine which are the main ones to be tackled in priority order. A joint approach exists to find resources to actually put the programs into place.

The NPWS work closely with both the Department of Primary Industry and Fisheries and the local landowners. The CVFS branch is looking at the introduced species issue in terms of protecting what the NPWS have in the reserves by controlling problems before they get into the reserves.

Introduced species are obviously affecting off-reserve areas, both private and public lands. With facilities, such as visitor centres, toilets, sewage system and roads, which are built for management purposes, the NPWS have to go through the process of doing environmental impact assessment and working at the best location and best practice. One good example is that the NPWS have sponsored a

PhD student at the Centre for Environmental Studies, University of Tasmania to investigate the best practice solutions for composting toilets.

In response to Q2, Bob Tyson replied that the CVFS branch is not directly involved with soil and water conservation but associated with Landcare through community partnership. The big success of Landcare in Australia has been that it involves the community. The community is the driving force in the program.

One initiative of the CVFS branch in developing community partnerships is the new Wildcare program which intends to get more community involvement in the full range of conservation issues. The Wildcare program spreads knowledge and information about the need of conservation more widely. There are similar schemes in other states in Australia in the form of the Friends of National Parks or community adoption of a particular hut or site, specific areas such as picnic areas or a section of walking track. The community takes the responsibility for maintaining their adopted area within the National Park.

The NPWS are looking at sponsorship from private enterprise. This is one of the aspects of Wildcare to attract sponsors to provide resources. For example, Wildcare attracts some sponsors from an outdoor equipment supplier and different companies to put money into specific projects or general programs.

With Wildcare, the sponsoring companies provide Wildcare members benefits such as discounts for their products or services. The member has to pay a membership fee and this fee is part of the resources that are allocated to individual groups to undertake work in the National Parks. The membership fee is AU$ twenty dollars and this will create a pool of money. The NPWS then set up a mechanism to allocate the fund to back up individual groups for particular projects.

The NPWS coordinate the Wildcare program and each individual group has their own organisation structure. In determining what project the Wildcare group will undertake, it will work closely with the NPWS. It could be in the form of building facilities, pulling out weeds, interpretation, guiding or administration. The NPWS would sign the Wildcare member up to help with the administration work. The NPWS provides free training, whatever the activities might be, such as marine rescue, wildlife rescue, eradication of weeds and track building.

There is a separate program funded by the federal government named Green Corps. This program aims to train youth in work skills, by involving them in developments with a conservation outcome. The Green Crops team signs up and runs the training program in a six months period. They are organised by Australian Trust for Conservation Volunteers. The NPWS regards the Green Crops program as very successful to date.

In response to Q3, Bob Tyson replied that there are a lot of issues which do need to have a whole government approach. The two principal agencies with land management responsibility in Tasmania are Forestry Tasmania and the NPWS.

There are also local governments and private landowners which manage the rest of the land. Inevitably there are different agencies which undertake very similar functions. This probably depends on how the bureaucracy is structured. In some regards, there are some positives in having the conservation management spread across more than one agency because this gets greater ownership of some particular issues. On the other hand, by having an all-in-one agency with a pool of expertise, issues are centrally focused.

Adequate coordination between agencies is achieved in Tasmania by having inter-agency working groups. For example, with fire management within Tasmania, there is inter-agency cooperation between the Fire Service, Forestry Tasmania and the NPWS. There are written protocols and plans to assist one or another in particular situations. Different agencies have worked through clearly defined responsibilities so there are no grey areas of doubt when bush fires happen. The responsibility has been established before fires happen.

In response to Q4, Bob Tyson replied that there are two important issues regarding environmental laws, one is quarantine which is the need for people not to introduce unwanted species; the other is vegetation clearance. There is a need

for some control over vegetation clearance on private lands. With most of the environmental laws, the big challenge in Tasmania is getting the community informed of the reasons for the laws. The education component is very important. Education gets people to appreciate why certain controls are in place. It is better than a heavy- handed approach.

In response to Q5, Bob Tyson replied that the international World Heritage Convention involves member nations, Non-Government Organisations listed with the International Union for Conservation of Nature (IUCN). There are guidelines that have been laid down internationally which the NPWS uses as a platform for doing the management plans and implementation of the plans.

To have a site accepted and listed as World Heritage Area is a very lengthy process. The rationale behind nomination is the prestige of being part of a global network of outstanding protected sites. The nomination can only be made by a national government.

The Australian government will not nominate a site as World Heritage Area unless the individual state agrees with the proposal. If a state government agrees with a particular proposal, the national government works with the state in preparing the nomination.

There is an expert panel, the members of which are provided by the IUCN and ICOMAS, and a council of twenty-one nations, which makes the final decision. The Tasmanian Wilderness World Heritage Area includes five National Parks and a number of other Historical Sites, Conservation Areas and some state reserves that are managed by NPWS.

The most recent World Heritage Area is the Macquarie Island and Southern Antarctic Ocean Islands World Heritage Area which was accepted by the World Heritage Committee just a few days before the interview.

In response to Q6, Bob Tyson replied that a lot of urban environmental problems can be tackled with adequate knowledge through education and adequate planning. There are educational programs related to issues such as waste disposal, storm water run-off and toxic chemicals, but there is still a long way to go.

In response to Q7, Bob Tyson replied that environmental education is a long-term process and the main thrust needs to be educating the teachers, people who teach and train teachers and Universities which provide teacher training.

Teachers influence the young, so children grow up with an understanding of what the issues and the problems are. The children will also be influenced by their parents and peers and vice versa. Progressively, there are more and more

children who understand environmental problems and they have influence over their parents. This is a good strategy, using environmental education to tackle environmental problems.

In the short term, it is still necessary to develop education programs for particular issues. This has been done quite a few times by the NPWS and has been very successful, for example, the Minimum Impact Bushwalking campaign.

Quite a few local governments and municipalities run similar programs to the NPWS Summer Program within their areas. There are some private field study centres in Tasmania which aim specifically to attract school children. The field study centres have environmental teachers and they take programs all year round.

Most of the schoolteachers do not have enough confidence to teach environmental issues. This is where it really comes back to teaching the teachers through teacher colleges or in the Education Department at the university. This needs to be the principle thrust of environmental education.

The teachers get the environmental teaching skills and experiences through training. It is a very difficult task for teachers, especially those who have been in the work force for quite some time. The main difficulty is to communicate with them because it is not compulsory to take further training. The NPWS does not have the resources to be able to go out to all schools and teachers.

In response to Q8, Bob Tyson replied that the NPWS do not directly fund the NGOs but the federal government provides administrative grants to them. There are the National Park and Wildlife Advisory Council and the World Heritage Area Consultative Committee, both set up by the Minister to provide policy and practical advice.

Representatives on these bodies include members of NGOs, such as the Tasmanian Conservation Trust, the Wilderness Society, the Recreational Land-use Federation and other recreational groups. Local government and the university also have people on these committees. These NGOs have a role in either providing general advice or in some cases, providing advice on a particular task, such as a planned tourism development.

In response to Q9, Bob Tyson replied that Australia does not have many formal exchanges or study tours with other countries. Generally the situations is that people like the interviewer come to Australia as a student and are able to pick up Australian experience.

The NPWS have a lot of difficulties in getting approval for resources to allow people to travel and they try to take advantage of meetings or conferences that do come up. For example there was a World Heritage Meeting in Thailand in January 1988, which was a good opportunity to share and exchange information.

The NPWS have some staff exchanges setting up between other states and other countries on a voluntary basis. Some staffs travel for recreational purposes, and spend some time gaining knowledge in their area. Others gain fellowships or scholarships related to their work.